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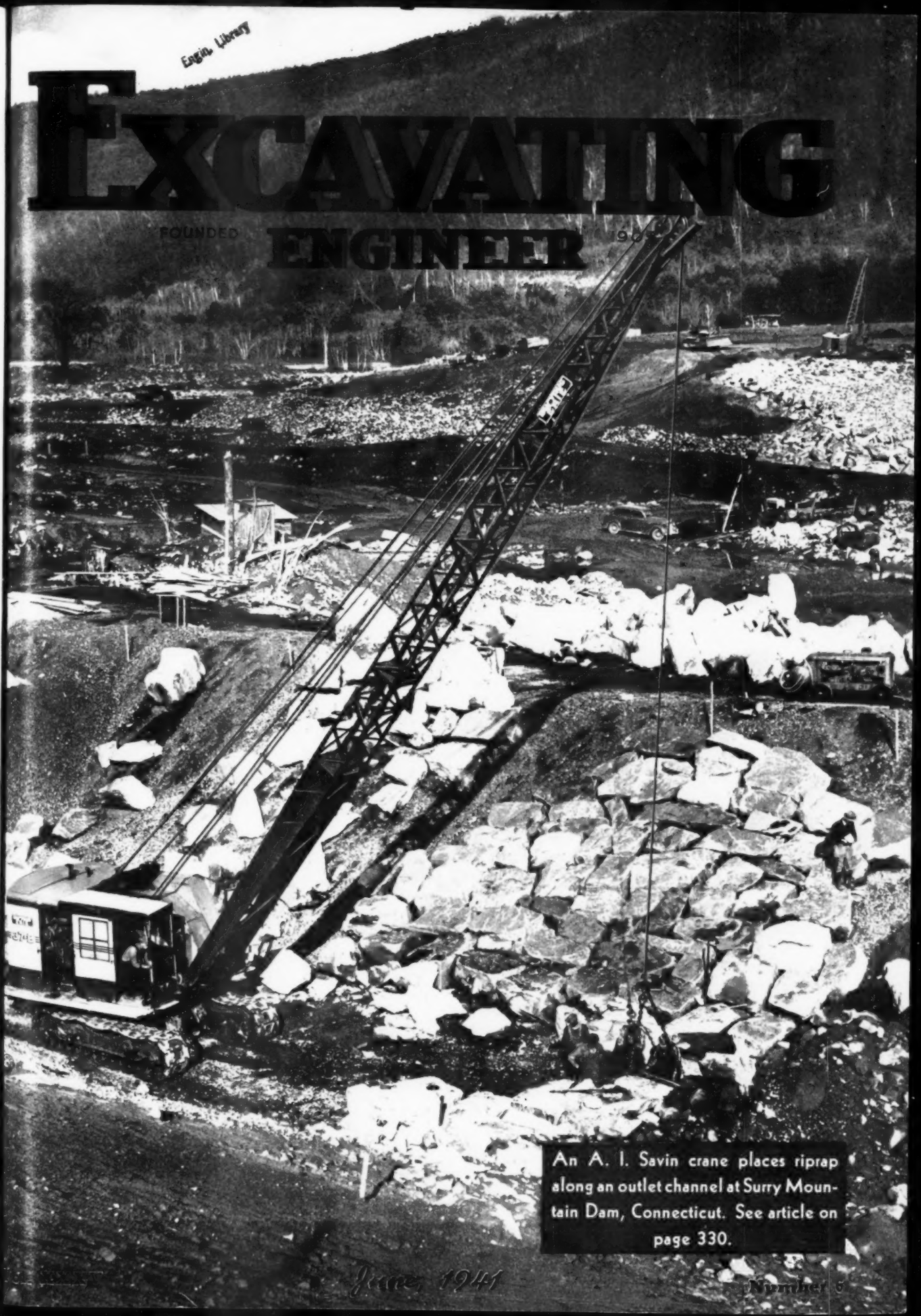

An A. I. Savin crane places riprap along an outlet channel at Surry Mountain Dam, Connecticut. See article on page 330.

June, 1941 Number 6

is BLASTING your problem?

BUCYRUS · ERIE

29-T

BLAST HOLE DRILL

IF you are engaged in the vital basic ore and stone producing industries, blasting IS your problem. National needs demand redoubled efforts in every field . . . . . blasting equipment can help meet this need for you.

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Consider the 29-T for instance. This machine, with the Bucyrus-Erie bit dresser, made possible the modern blast-hole technique of large-diameter holes drilled farther apart. This method is being used, where formations permit, by many of the large mine and quarry organizations to obtain 30 to 50% reduction in preparation costs AND increased output. Modern 29-T blast-hole drills, carrying heavy strings of tools, can drill large-diameter holes at practically the same speed that old style drills drill smaller holes. With a wider spacing possible with these larger holes, less drill footage is required with a smaller number of holes, less moves, and fewer set-ups. The same amount of powder is used per ton of material to be blasted, but because it can be better distributed in the large holes, it is usually possible to obtain a more uniform fragmentation with less oversize and less secondary blasting necessary. The 29 . . . of course, equipped with the popular Bucyrus . . . safety-first tool platform and built-in tool wrench . . . lets your drill crew work off the rough ground . . . without the need of dangerous hand-lifting and . . . lays needed for making tool changes with old . . . toned heavy wrenches and tracks.

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EXCAVATING ENGINEER

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Yarding giant fir logs is just about as severe a service as Diesel engines are called upon to perform. The shock loads imposed when a log is being hauled in are sometimes tremendous. Yarding logs is just another of the "tough jobs" that Atlas Diesels handle with ease.

Pictured here is an Atlas Diesel-powered yarder that has been in the Crown Willamette woods for twelve years, having been moved from one location to another over all kinds of ground. During this period it has piled up 16,000 operating hours, and the repairs have consisted only of minor parts. Fuel and lubricating oil costs have, for many years, averaged 4½¢ per M board feet.

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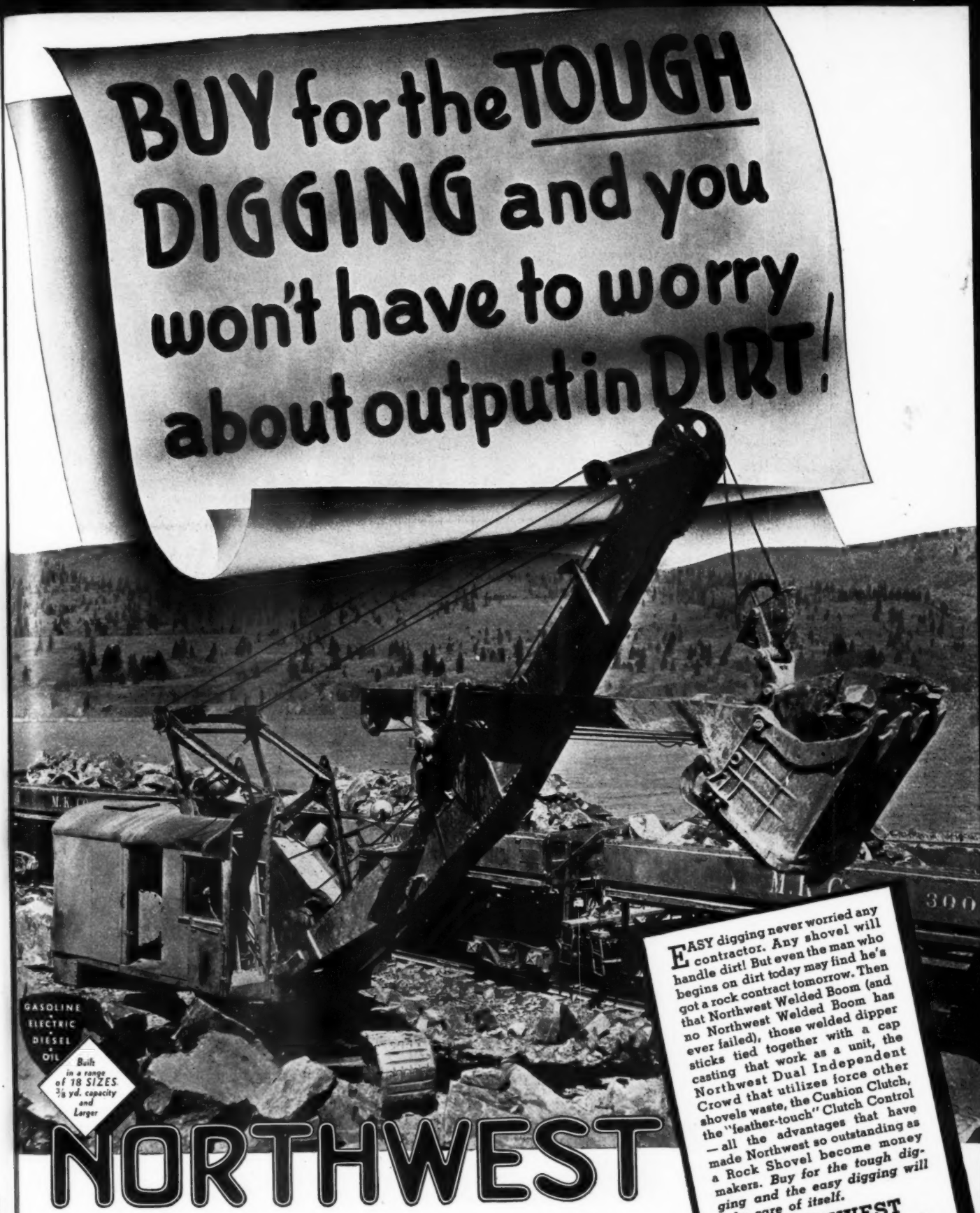
DEPENDABLE · ECONOMICAL ATLAS Imperial DIESEL ENGINES

For your convenience in writing to Atlas Imperial Diesel Engine Co., you will find a card bound in this issue.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EASY digging never worried any contractor. Any shovel will handle dirt! But even the man who begins on dirt today may find he's got a rock contract tomorrow. Then that Northwest Welded Boom (and no Northwest Welded Boom has ever failed), those welded dipper sticks tied together with a cap casting that work as a unit, the Northwest Dual Independent Crowd that utilizes force other shovels waste, the Cushion Clutch, the "feather-touch" Clutch Control — all the advantages that have made Northwest so outstanding as a Rock Shovel become money makers. *Buy for the tough digging and the easy digging will take care of itself.*

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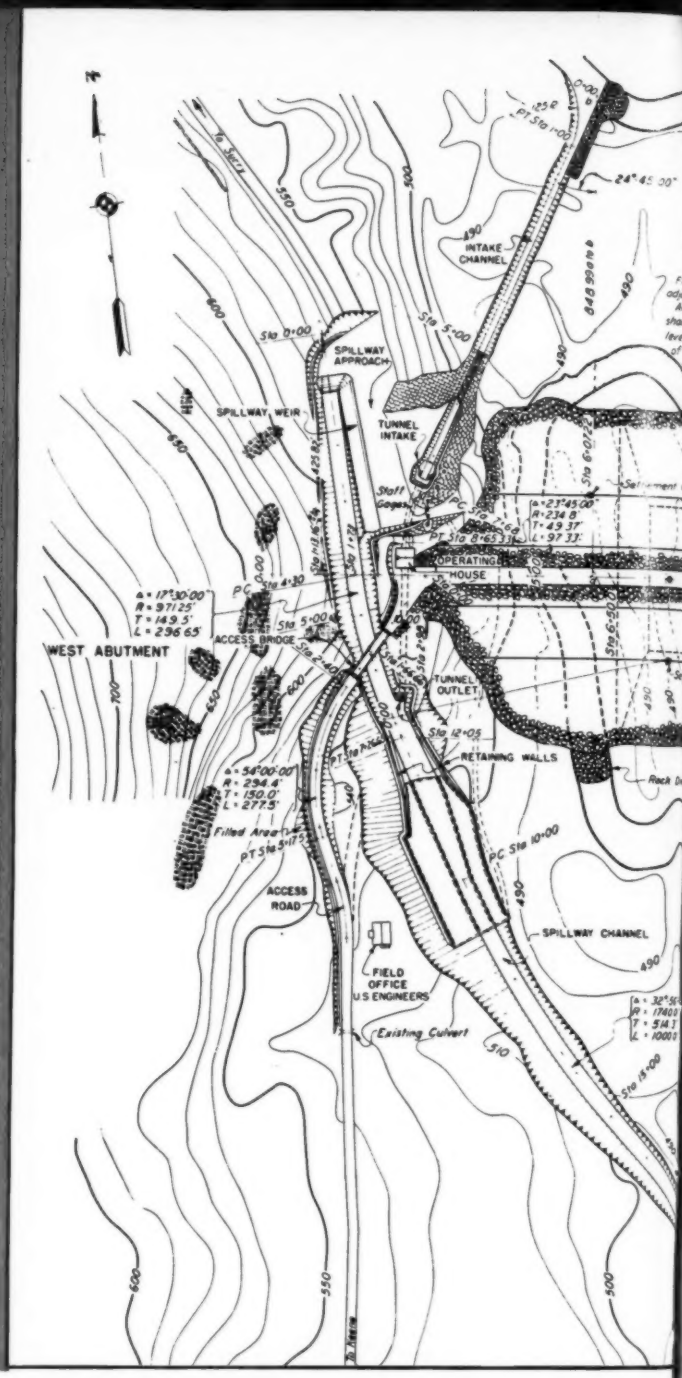
SAVIN BUILDS A DAM



A. I. Savin Construction Company of Hartford, Connecticut, puts a safety valve on New Hampshire's Ashuelot River for Uncle Sam as a part of the Government's current Connecticut River Flood Control Project

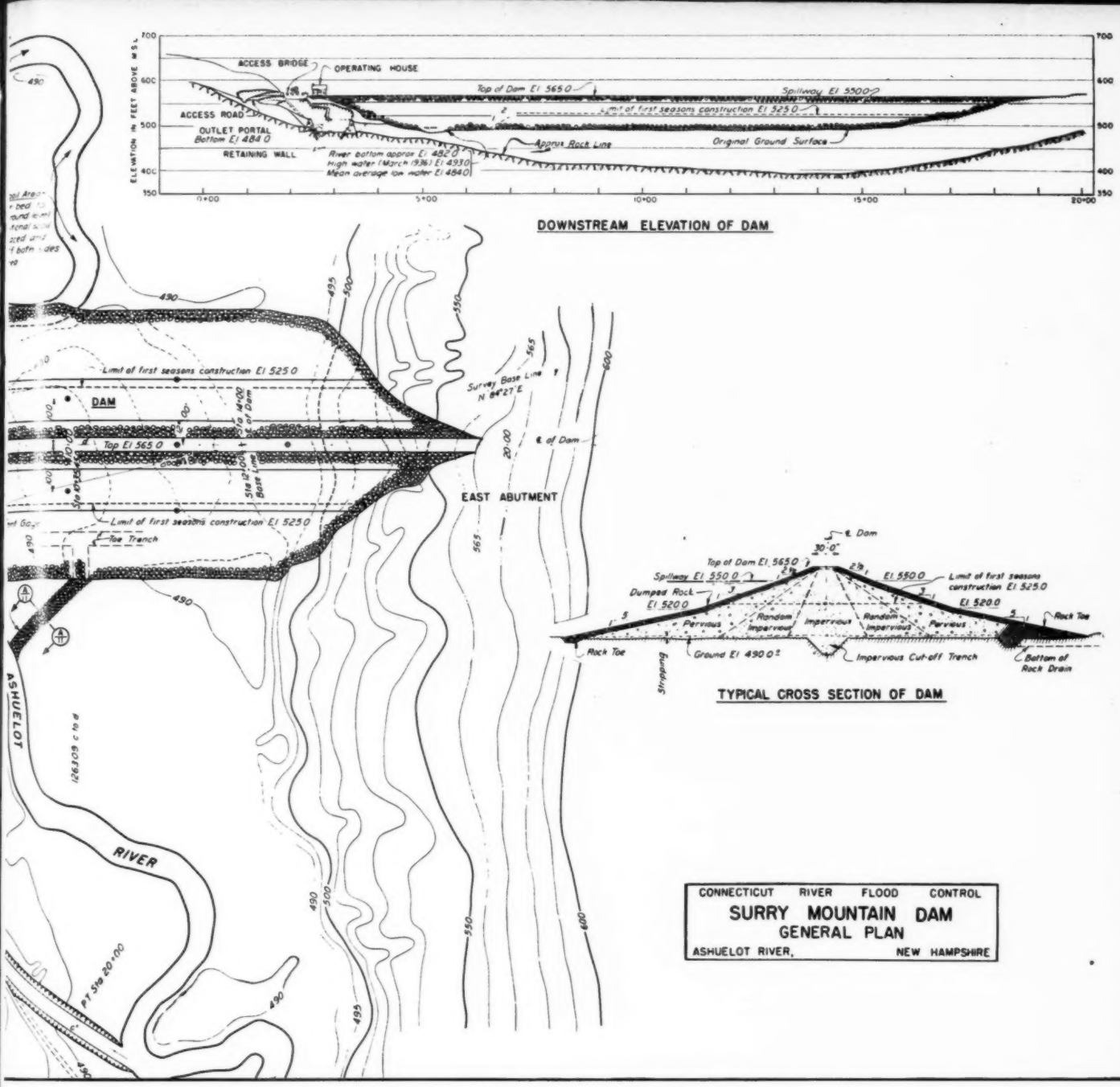
By SPENCER JONES

WHEN the early New England settlers refused to heed the friendly warnings of the Indians and persisted in building permanent structures on the banks of the Connecticut River and its tributaries, the results were twofold. Water power and river commerce helped create a great manufacturing area, but time after time the rivers rose, as the Indians had predicted, and became uncontrollable destroyers instead of peaceful producers.

Removal of the original forests and other forms of soil denudation, combined with thick snow blankets on the hillsides and hard-frozen valley floors, had made the entire Connecticut River valley a potential danger region in March, 1936. Then a low pressure center, loaded with water from the Gulf of Mexico, drifted in from Texas and dropped torrents of rain. The runoff was so rapid and the volume of water so enormous that every tributary of the Connecticut River became a raging monster, with the Connecticut, itself, the granddaddy of them all, taking the lead in disastrous floods.

One of these tributaries, the Ashuelot River, in southwestern New Hampshire, which has an average discharge of about 400 cfs into the Connecticut, started discharging about 8,000 cfs, causing considerable damage in Keene, Winchester and Hinsdale, as well as increasing the amount of water to be carried off by the already swollen Connecticut.

To prevent such catastrophes in



• U. S. Army Engineer's general plan of Surry Mountain Dam showing fill and riprap areas and typical cross section of this Connecticut River Flood Control project.

the future, the United States Congress passed the Flood Control Act, approved June 22, 1936, under which authorization the United States War Department, Corps of Engineers, U. S. Army, through its various U. S. Engineer Offices, is designing and constructing numerous flood control projects, not only in the Connecticut River valley.

Rolled Earth Fill Dam

The Connecticut River Flood Control Project, which includes dams, dikes, conduits and other flood control measures along the Connecticut and its tributaries, provides for the construction of a rolled earth fill dam, inlet structure, outlet works, spillway "and all appurtenant works" on the Ashuelot River about 34.6 miles above its confluence with the Connecticut and about five miles upstream from Keene, New Hampshire.

The Ashuelot River drains a total area of about 420 square miles, principally in New Hampshire, 100 square miles of which are above the dam site.

Bids on the project were invited June 20, 1939, and on August 16, 1939, the contract was awarded to A. I. Savin Construction Company, Hartford, Connecticut, on their bid of $886,000.

Chief items in the contract

• General view of fill placing operations at Surry Mountain Dam. Note dark strip of selected impervious fill in the center and rock riprap work on each side.

• A Linn tractor truck dumps a load of fill for the attention of the Allis-Chalmers equipped with a Baker 'dozer at the left.

• Rigged as a clamshell, a Bucyrus-Erie 37-B cleans up the spillway area.

are given in the following list:

Diversion and care of river—Lump sum	$15,000.00
Clearing and grubbing—Lump sum	35,000.00
46,000 cu. yds. Common stripping—Per cu. yd.	.40
148,000 cu. yds. Common excavation—Per cu. yd.	.30
533,000 cu. yds. Excavating and hauling of borrow from 4 pits—Per cu. yd.	.20
225,000 cu. yds. Excavating and hauling of borrow from 1 pit—Per cu. yd.	.25
31,000 cu. yds. Excavation of cutoff trenches in earth—Per cu. yd.	.50
107,000 cu. yds. Rock excavation, open cut—Per cu. yd.	1.20
2,800 cu. yd. Rock excavation, tunnel—Per cu. yd.	12.00
700 cu. yds. Rock excavation, gate shaft—Per cu. yd.	12.00
867,000 cu. yds. Rolled earth embankment—Per cu. yd.	.07
37,000 cu. yds. Selected pervious fill—Per cu. yd.	.50
136,500 cu. yds. Dumped rock in embankment—Per cu. yd.	.50
12,800 bbls. Portland cement—Per bbl.	2.30
2,700 cu. yds. Concrete tunnel and shaft lining, etc.—Per cu. yd.	15.00
6,000 cu. yds. Concrete spillway weir, lining, retaining walls—Per cu. yd.	10.00
128,730 lbs. Reinforcing steel, furnished, bent and placed—Per lb.	.04
Operating house superstructure—Lump sum	10,000.00
80,000 lbs. Structural steel for access bridge—Per lb.	.07
Furnishing and installing gates and accessories—Lump sum	40,000.00

The gates are known as Broome Self-Closing Sluice Gates. One is provided for each of the two outlets, which are 4′-6″ wide by 10′-0″ high, and each service gate is provided with an electric-driven sluice gate hoist for operation. In addition, each outlet is provided with an emergency gate for protection. The emergency gate is interchangeable in the two outlets and is operated by an electric traveling hoist which is constantly attached to the emergency gate and may travel with it from one opening to the other.

These service and emergency gates are structural steel affairs traveling on stainless steel rollers which are continuous, like a caterpillar chain, and the fit of the vertically traveling gates against the inclined sealing planes of the shaft must be extremely accurate, as also must be the fit of the bottom

seal. This involves careful excavation and lining of shaft and tunnel in order that the seals and roller races will make a watertight fit.

Work was started by the contractor August 22, 1939, with the contract completion date set at 760 calendar days from notice of award. Several varieties of penalty clauses were included in the contract, among them a penalty of $50 per day if the embankment was not completed to elevation 525 (less than half its height, but considerably more than half its volume) by November 1, 1940. This proviso was met with several feet to spare. Another clause penalizes the contractor $50 per day for not finishing the entire job on time.

Let's get it straight right now that this is not a conservation dam. No water is stored behind it except in time of flood. Normally the Ashuelot River flows through a tunnel at the western end and the gate valves in the tunnel are to be closed only when it is desired to keep the flow of water below the dam at a safe maximum.

However, the dam is designed to impound, temporarily, about 32,500 acre feet at spillway elevation, which would make a 1,000-acre lake 65 feet deep, 1 mile wide and 3½ miles long. If the water ever pours over the spillway in a stream 10 feet deep, the maximum surcharge, there will be 43,200 acre feet impounded in a 1,150-acre lake 75 feet deep, 1¼ miles wide and 4 miles long. Even at maximum surcharge, the crest of the dam will be 8 feet above the water, for it is 83 feet high. The length of the crest is 1,700 feet and across the top a maintenance road is to run.

But let's start building the dam. A granite rock line, determined by U. S. Engineer Department borings, outcrops at the west end, but curves down to about 80 feet below the bottom of the dam all the rest of the way across the valley. Naturally, the diversion tunnel, gate shaft and spillway are located in the granite, while practically none of the work on the dam itself involves removal of rock.

Rock and Earth Division

This division of materials made it possible for A. I. Savin Con-

(*Continued on page 366*)

• Ingersoll - Rand wagon drills put down blast holes in the hard rock of the spillway cut.

• Equipped with a LeTourneau 'dozer and sheepsfoot rollers, this Caterpillar tractor grades and compacts random pervious fill in the embankment area.

• A. I. Savin's 1½-yard shovel has been plenty busy on this job. Here it handles some tough material during preliminary excavation operations.

TVA Job Management

Methods of analyzing production, maintenance, disposal, and organization and value of plant are presented in this second and concluding discussion of TVA job management procedure

By PHILIP H. KLINE

Editor's Note: The first installment of this article by the former head of TVA's Construction Plant Operations Section appeared in the May, 1941 issue of Excavating Engineer.

THREE MAIN FACTORS should be kept in mind for production operation — the quantity or volume produced; the time required; and the quotient of those two in comparable units, or the rate of production. It is the one criterion uppermost in the real construction man's mind. To keep up a diminishing stock pile, to beat a rapidly rising river or adverse weather conditions, to meet a payroll with yards, tons, or feet, at so much "per" is what keeps the job running.

The headings for a simple form of volume recording used for single operations need show only the machine numbers, totals daily and to date and, if desired, the load count by shifts. On one job, at the start of a large earth moving program, the superintendent desired information for controlling the new operations and determining the proper number of haulage units to use throughout the job. A field checker's tabulation as shown on Figure 4 developed a lively spirit of inter-shift competition. Drivers strived to gain extra positions at the loading unit, which in this case was an Adams elevating grader. On another job, the blasting foreman's report of holes loaded provided a check of drilling production. At Hiwassee Dam, the performance of blast hole drills was observed carefully by this method.

To clearly define equipment performance hours, all possible terms were outlined to field clerks by printed instructions. The form headings generally used were shown and the breakdown of time elements was explained under these headings:

(1) JOB WORKING HOURS. Not elapsed time, but generally shift time such as three six hour shifts equals 18 hours.

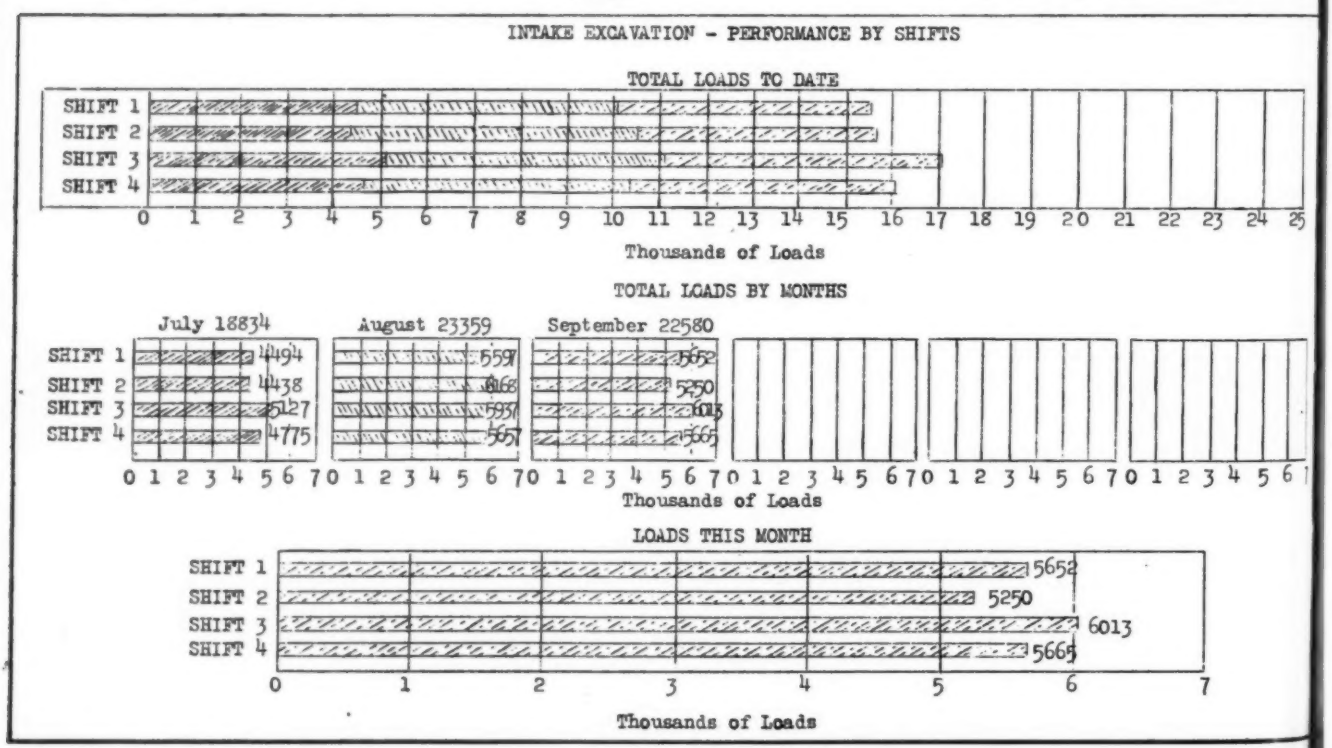
(2) OUT OF SERVICE HOURS. Stand-by because of weather or job. Further broken down to show time under repair, no operator.

(3) OPERATING HOUSE:
- (3a) GROSS—with operator, difference of (1) and (2)
- (3b) DELAYS — show each Mechanical Job, and Other.
- (3c) NET OPERATING HOURS —All service, (3a) minus (3b)

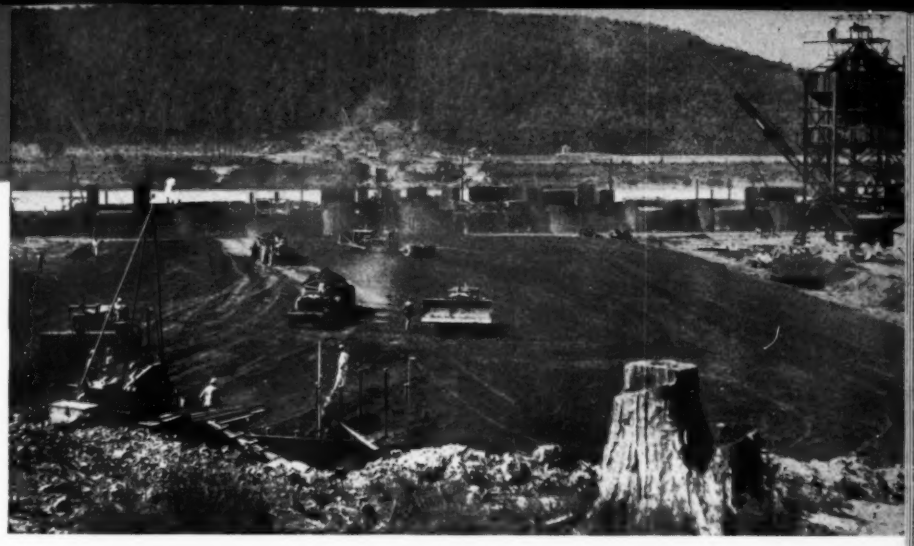
(4) PER CENT JOB HOURS: Net Hours Job Working Hours x 100.

Note: Blank columns of this form can be used to show special production breakdown or other equipment use.

On many jobs and operations, all the detail given was not required, and some breakdown was eliminated. The item, "Net Operating Hours," is the unit most referred to and is recorded for all major (rated) equipment. "Mechanical Delays," is also important in that it represents the intensity and recurrence of field shutdowns which may indicate a serious interference with production and may not be distinguished from ordinary job delays. The machine shift report is the basis of securing routine production data.



• **FIGURE IV—Large sized charts of this type posted on the job develop a lively spirit of inter-shift competition among TVA employees.**



• Rolled fill operations at Guntersville Dam show a coredrill, 'dozers, dump wagons, and sheepsfoot roller in action. At the right a crane with a boom extension erects a mixer plant.

Four typical forms are shown in Figure 5, which also shows form TVA 1298 for daily and monthly summaries. To summarize equipment use at Pickwick Dam, a wall chart was made similar to Figure 6. Any consistent X-ing denoted machine weakness or over-severe service. Large blocked areas indicated overplanting of equipment and, possibly, machines available for other work. A large clear field shows all working and going well, a record proud to point to. An ingenious "three-dimensional" time chart was developed at Norris Dam to show (1) the day of the month, as the abscissa; (2) the time of day, as the ordinate; and (3) the duration and type of delay as a blocked vertical area shaded to represent mechanical, cable replacement, waiting or miscellaneous delays. The shift changes were at six and twelve o'clock and in most cases were properly used for minor attention to the equipment or work in hand.

Time, production, and cost data were combined on one chart at Norris Dam. Two bases, net and shift hours were shown on the same chart. Cost data rates shown graphically sometimes bring out badly distorted fluctuating monthly charges when other than standard rates for repair and depreciation are used. On such a comparison, four like machines were operated at two different jobs. The cost per net operating hour should have been about the same but the chart showed almost double expense at the second job. An investigation revealed that varying kinds of charges were being included in the costs. The records were then revised to a more comparable basis. It was clearly

TENNESSEE VALLEY AUTHORITY MACHINE _____

EQUIPMENT PERFORMANCE DETAIL T.V.A. NO. _____

(ACCUMULATION OF HOURS FOR T.V.A. 666)

PROJECT _____ MONTH _____ 19__

DATE	JOB WORKING HOURS	OUT OF SERVICE		OPERATING HOURS (WITH OPERATOR)							REMARKS
		STANDBY	REPAIR	GROSS HOURS	DELAYS			NET HOURS			
					MECH.	MISC.					
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	

* GROSS "HOURS" INCLUDE "DELAYS" -- DO NOT SUBTRACT

TVA 1293 A (CON-9-38) SHOVEL--CRANE MAKE SIZE NO. OPERATOR BADGE NO. DATE SHIFT 1 2 3 4

MATERIAL HANDLED	INTO	AT	ATT. NO.	*HOURS	ACCT. NO.
(A)					
(B)					
(C)					

* GROSS "HOURS" INCLUDE "DELAYS" -- DO NOT SUBTRACT

TVA 1293 A (CON-9-38) TRUCK TRACTOR MAKE - SIZE TVA NO. OPERATOR BADGE NO. DATE SHIFT 1 2 3 4

LOADS	MATERIAL	FROM	TO	PURPOSE	*HOURS	ACCT. NO.

* GROSS "HOURS" INCLUDE "DELAYS" -- DO NOT SUBTRACT

TVA 1293 F (CON-9-38) EQUIPMENT ITEM - MAKE - SIZE NO. OPERATOR BADGE NO. DATE SHIFT 1 2 3 4

DESCRIPTION OF WORK	*HOURS	ACCT NO

TVA 1293 E (9-15-38) CORE DRILL NO. MAKE AND SIZE OPERATOR BADGE NO. DATE SHIFT 1 2 3 4

HOLE NO.	LOCATION	CASING SIZE	CASING LENGTH	CASING DEPTH	DEPTH START	DEPTH END	FEET DRILLED	REMARKS-ADDITIONAL MEN AND EQUIP. ETC.	HOURS DRILLED	ACCT. NO.

BIT SIZE	BIT NO.	FEET DRILLED	REMARKS

DELAYS IN MINUTES

MECHANICAL:-	MIN.	OTHER DELAYS:-	MIN.
(1)		(8) ROUTINE SERVICE AT ____ AM PM	
(2)		(9) GREASE ☐ OIL ☐ FUEL ☐	
(3)		(10)	
(4)		(11)	
(5)		(12)	
(6)		(13)	
(7)		(14)	
TOTAL		TOTAL	

GROSS EQUIP. HOURS

TOTAL DELAY HOURS

NET EQUIPMENT HOURS

OPERATORS TIME CHARGE DURING DELAYS:-
ON EQUIP. _____
REPAIRING _____
CHECK OUT _____
OTHER _____

• FIGURE V — These four typical TVA machine report forms as well as the larger form for daily and monthly summaries are an effective way of recording routine production data.

brought out, however, that production rates in themselves, by study of time and volume elements will often indicate proper equipment trends. Throughout all equipment performance studies and analyses it was evident that "key" factors can be found that have more to do with controlling output than the mass of detail often collected and presented. Executives insist on "the nub" or "slide rule accuracy" or "major worthwhile improvements" for their immediate consideration, leaving the historical or final averages for attention during off season or closing periods.

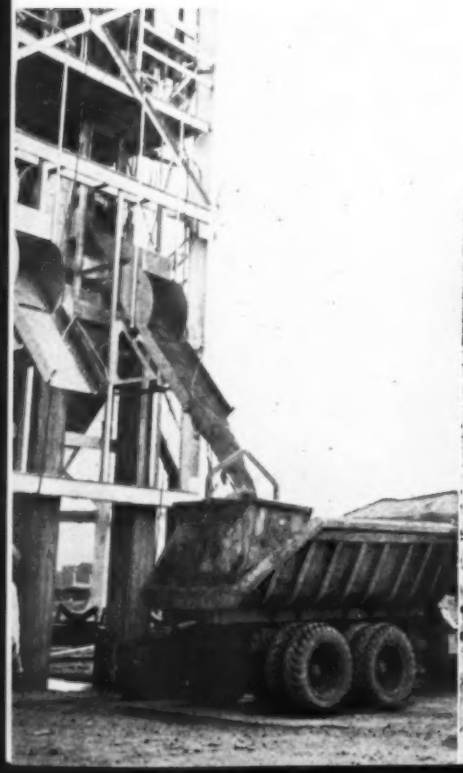
The depth of hole being drilled was a great factor on drill performance secured from a 1934 test. One make showed a decided ability on short holes, and all drills showed moving time to equal three lineal feet of hole per hour from a theoretical machine speed of nineteen feet per hour. Blasting, hung steel, miscellaneous and mechanical delays brought the actual performance down to less than thirteen lineal feet of hole per hour. The narrow range between the average of each make and the grand average for all drills was well within the limits of accuracy of such work. There may have been special conditions, such as low air pressure, extra hard rock, or operators unfamiliar with one machine that would make considerable difference if applied to only one drill in one type of hole. There may be some long range features of equipment that will not develop in such a short test; mechanical ability sometimes does not show up in a pure production rate sudy.

• Here is an example of equipment coordination as an Adams grader towed by a Caterpillar tractor loads Euclid Trac-Truks.

Mechanical Considerations

The field forces control mechanical adjustment and repair, although especial attention to design improvements is given by a staff of mechanical engineers centrally available. Operating schedues of lubrication and inspection vary according to job organization, from detail reports at the end of each shift, direct from the operators to the superintendent, to stickers, tags, and check sheets or special crew assignments according to the service and equipment demands. A distinction is made between routine mechanical attention, which is largely dependent upon current production demands, and those major overhauls which affect long range plans for the use of the equipment. Since the aggregate of all repair expense is apt to be such a large part of the final machine investment (and hence of the "use-rate" charge for the machine service), the controls set up for these repairs are given careful attention.

Standard replacements are observed from warehouse or stores ledger records. A summary of parts by makes of machines and dates of issues is compared to the service and production log. Shop orders collect labor and materials chargeable to each machine, the same continuing number being used for successive months. The order cards are entered direct by the mechanic and show both material from shop stock and from warehouse issues. Labor is entered direct in hours and extended in rates per hour by the clerical forces. These may be summarized according to the machine part assembly (motor, drive, tracks, cab, etc.) and show the date, service to date, brief description of the repair, approximate cost and reason for repair. Notes may be added for general condition statements. Master mechanics like this report, since it gives them a reference of current replacements,

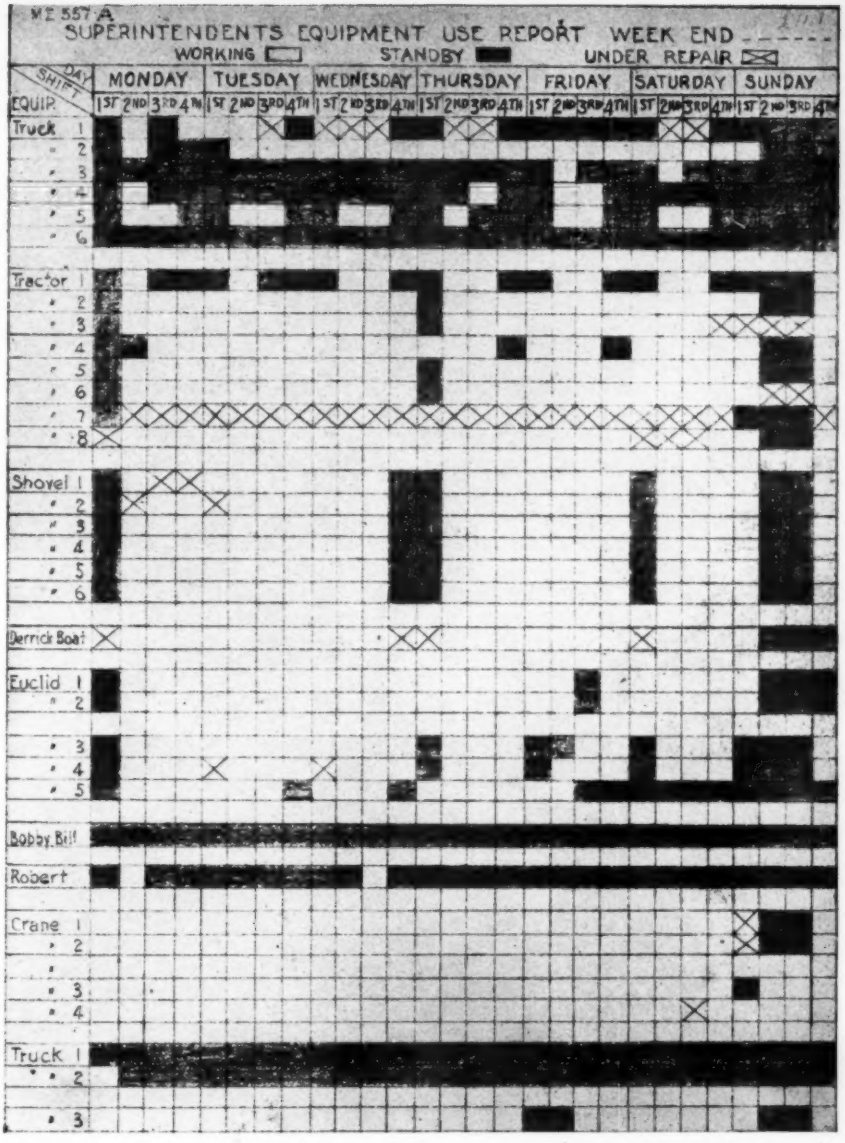


• Left: Job adaptation of equipment is practised by TVA as an excavation truck is kept busy both ways on a shuttle haul by carrying concrete on the way back. Right: Their dipper sticks removed, two Bucyrus-Erie 75-B's worked with an equalizer yoke in placing the 100-ton bowl of Hiwassee's primary crusher.

indicates the parts numbers used, and supplies data for future repair estimates. Spare parts control is available from such data, and standardization of repeating items is possible. A check of bearings used on various makes and types of equipment indicated that emergency and standard substitutions were possible. In many cases bearings are purchased direct from the bearing manufacturer at considerable savings. Cable records indicate possible economies on carry-type scrapers, draglines, cableways, etc. A special type of control chart was used for major parts replaced on the dredge "Dallas." Each shell liner, impeller or important disc was listed in like groups as ordered. Vertical monthly columns showed the operating hours by fifteen day periods. Plotted horizontally were shown the parts on order; the promised delivery date; those on hand, in service or out of service but still usable; and those under repair. Later, when a detail study was needed for shell design and materials, a repair and service log book was established. Cross sections of used shells were plotted by superimposing sketches of like shells on the same outline. Worn places were studied for new designs of shell thicknesses, liners, and possible redesign of impellers.

Cooperation with the manufacturer is found to be of mutual advantage. Spare parts stocks can be materially reduced if they are readily accessible by job forces from a local market. Inspection and maintenance checks provide another worthwhile service by manufacturer cooperation. Lubrication and operating problems are reviewed. On one job operating ropes are carefully selected following the shovel or crane manufacturer's recommendations where feasible. Special assembly or shipping information is often available from dealers and manufacturer's representatives.

Improvement of over-all practices is possible through exchange of mechanical advices between jobs. A series of bulletins have been issued covering operations of all the major equipment under varying service conditions and locations, and embracing advantages, improvements, and general equipment history. At times special reports are issued to call attention to novel devices or attachments, cable socketing, turning of shafts or rims, precast setting of diamond drill bits, hardsurfacing aids, etc. Boiler inspection is made annually on all equipment in service and upon pressure vessels such as air receivers.



• **FIGURE VI — Equipment performance at Pickwick Dam was graphically presented by weekly charts of this type, X's denote repair and blocked out areas, idleness.**

Keeping Cost Accounts

Cost accounts are used for at least two purposes: segregating controllable expense for immediate correction and providing a final cost record that allows engineering estimating or comparison, and financial balances. Equipment operations plays the largest part in the former. In comparing current methods of doing work, the charges for the "bare" equipment are fairly well established from previous discussions. Other charges are labor, fuel, and "expense." Some equipment is consistent in its duties, such as quarry production, stationary hoisting or pumping. Other machines, such as trucks, tractors, and railroad equipment, are apt to serve a variety of operations, in which case separate cost distribution is essential to each product served. Collection accounts for all machine expense are set up for the latter type of service, or,

(*Continued on page 372*)

SAFETY FIRST!

In back of almost every serious injury and death on construction work is the fatal human tendency to disregard proper safety precautions

By JOHN R. MARCY

THE BIG dragline crawled along the edge of the excavation to a new location. As it passed under a 2,300 volt transmission line there was a crackling flash as the tip of the long steel boom came in contact with the wire. Had the steel frame of the machine been properly grounded, or if the boom point had been encolsed in a wooden cage, no serious damage would have been done. But two men, one riding the boom and the other with his hand resting against it, paid the price of someone's neglect.

No one could blame the truck driver or the shovel operator when a worker was killed in a certain rock quarry. The truck was backing up to be loaded at a point where the driver couldn't see him, and there was so much noise from the shovel and from a nearby stone-crusher that the unfortunate victim didn't hear the truck that killed him. Of course, if there had been a signal-man on the job this man would still be going home every night to his wife and two kids. Quite a price to pay for a minor economy!

Most accidents wouldn't happen if the proper precautions were taken. The majority of them are caused by human rather than mechanical failure, and can be avoided by intelligent safety planning.

Typical Accident Cases

Here are four typical accident cases. They're from company records—not imaginary. The men were real flesh and blood who could talk and work—and feel pain.

Case 1: A man cranked the motor of a bulldozer that was standing on an incline. The wheels of the machine were not blocked and it rolled down the grade. Trying to climb into the operator's seat the careless operator slipped and fell between the tractor treads and the frame, receiving fatal injuries.

Case 2: When a tractor operator was called away from his machine for a few minutes, an unqualified workman tried to take his place. He got the machine in motion, but lost control of it, with the result that it struck and killed one of his fellow employees.

Case 3: A workman who was passing by a stationary tractor, was fatally crushed between it and a moving tractor over which an inexperienced operator had lost control.

Case 4: Another operator who lacked experience "gunned" a tractor while it was traveling on soft ground. The tractor climbed the ring gear, turned over, and fell on the operator, causing fatal injuries.

Such accidents could be greatly reduced if the following precautions were taken:

1. Employees must be properly

• C. G. Willis and Sons, Inc., protected their Koehring dragline from nearby high tension wires during a bridge abutment excavation job at Los Angeles, California, by placing a wooden cage over the boom point.

trained before being allowed to operate or handle mobile equipment.

2. Mobile equipment, self-propelled or otherwise, must be adequately blocked when left standing on an incline or a hill.

3. Before an operator leaves his machine, even if only for a few minutes, he should stop the engine and set the brakes.

4. Invariably, every operator of a self-propelled machine should make sure that all controls are properly set before starting the motor.

5. Definite instructions must be given concerning the correct method of operating, in order to avoid the possibility of a tractor climbing the ring gear and going over backward. This may occur if the tractor is "gunned" on soft ground or on a steep grade or while hauling a heavy load.

Can These Happen To You?

The five fatal accidents briefly outlined below are chosen because they are typical of those that may be expected unless all possible precautions are taken and constant attention is given to safe procedure. In each of these cases, subsequent investigation showed that the dangerous possibilities could have been foreseen and that the accidents could have been prevented if suitable action had been taken. This is made evident by the "reason for occurrence" assigned, the actual cause being human rather than mechanical failure.

• On-the-job lubrication service with mobile units of this type is the best kind of accident insurance, for underserviced equipment is always vulnerable to accidents.

Attempting to repair motor of tractor while engine was running, operator accidentally struck the clutch lever, causing the tractor to move forward. He was thrown from the machine, striking it with his head as he fell. (Reason—Failure to stop engine prior to making repairs.)

Fell from truck used for transportation of workmen. (Vehicle not equipped with seats or side racks.)

Riding on truck of cement. Jolting of truck on rough road threw workman from vehicle. (Riding on load, and excessive speed for road conditions.)

Repairing truck. Truck body was elevated and held in position by a prop which broke, crushing mechanic between body and frame. (Defective prop used—merely a piece of rotted fence post.)

Removing truck tire. Tire blew off wheel and struck employee. (Failure to deflate tire before removing rim.)

• Mobile equipment parked on high inclines should be securely blocked to avoid dangerous runaways.

The transportation of employees in motor trucks and other vehicles is usually highly disastrous in case of accident, because, as a rule, a considerable number of persons are exposed to injury. For example, a truck carrying 24 workmen, in addition to the driver, overturned while rounding a curve on a gravel road. Two of the riders were killed, and the other 23 men were all injured in some degree. The truck was traveling about 40 miles per hour, and the regular operator was not at the wheel because he was tired from having driven some 300 miles on the same day.

Various factors and conditions helped to bring about this accident, among them being excessive speed, overloading the truck, and either failure to issue proper instructions or to enforce instructions that had been given—in

(Continued on page 371)

• Extreme right: A Bucyrus-Erie 5½-yard scraper towed by an International TD-14 scoops up a load of gravel, hauls it 1,000 feet and dumps it into a grizzly-covered hopper (right) to a conveyor belt which feeds the Barnes washing and screening plant.

Barnes Sand & Gravel Company of Piketon, Ohio, excavate gravel for state and federal roads with a 4-wheel, 5½-yard scraper

BARNES SAND

INCORPORATED in 1907, the Barnes Sand & Gravel Company is one of Ohio's oldest producers of sand and gravel. The present property is located about six miles out of Piketon, in the southern part of the Buckeye State, and comprises 25 acres which have been proven with hand-drilled test holes put down in each acre.

Present production is principally of gravel, due to the limited demand for sand. State and Federal highways are the main market for Barnes gravel, although some is also sold for building construction.

Both stripping and loading are handled by a Bucyrus-Erie S-63 4-Wheel scraper drawn by an International TD-14 TracTracTor. This scraper has a struck measure capacity of 5½ yards. Overburden on this property has an average depth of 2 feet 8 inches. The usable sand and gravel deposit has an average thickness of 30 to 35 feet. Material below this runs too heavily to sand which is not profitable to handle under present conditions.

At the time the job was visited, the scraper was loading gravel on the down-hill slopes of a V-shaped cut, hauling it about 1000 feet and dumping it into a grizzly-covered hopper which feeds the washing and screening plant. When the

• Gravel from the hopper is carried to the top of the washing and sorting plant by this 18-inch Goodyear conveyor belt.

• The finished product receives a final washing as it leaves the storage bin for the waiting truck.

D & GRAVEL

hopper is full, the scraper takes time to pick up a load of overburden on the return trip. With the comparatively thin overburden and thick gravel deposit, this method of operation keeps an adequate supply of gravel uncovered with the use of only the single digging unit for stripping and loading. Production averages about 600 tons per eight hours.

From the hopper, material is conveyed on 18-inch, 6-ply, type W Goodyear belt to the top of the Columbus Conveyor Company plant which is equipped to turn out three sizes of gravel and two of sand. The material goes over a two-deck New Holland vibrating scalping screen. Material from this screen passes through a Stedman single cage disintegrator which breaks up mud balls and eliminates soft gravel. All the material then passes to a 3 deck New Holland sizing screen which separates the material into the desired sizes, the gravel going to the various bins and the sand to two Columbus Conveyor Company dewatering drag type tanks.

All the material is washed, water being pumped from a deep well by a Fairbanks-Morse pump. The well is equipped with 8-inch 15-foot Cook strainers. Electric current for plant operation is furnished by a 100 h.p. Delavergue diesel engine which has been in continuous operation since 1911.

When sand and gravel is not loaded directly for shipment, it is stock piled in the company's yard. Two trucks with 3½-ton bodies (1 Chevrolet and 1 International) take material from the plant and dump it at the respective piles. These trucks also take rejected material from the plant and waste it in worked out areas. Rehandling of stock piled material is handled by a ⅜-yard Insley shovel and a ½-yard General equipped with clamshell and shovel booms.

C. M. Ault, secretary-treasurer and superintendent of Barnes Sand & Gravel Company, is in active charge of the operations at Piketon.

• A ½-yard General clamshell swings its bucket over the stock-piled gravel as it prepares to load out an order.

Field NOTES

Quarry Nuisance Decision

Even though a quarry was operated many years in a section before homes were built near it, the rights of the home owners in the eyes of New Jersey law are more important than the rights of the quarry operators, it was ruled by New Jersey Vice Chancellor Alfred A. Stein in issuing a sweeping injunction in his court at Elizabeth against operation of the Kernan Quarry in South Orange in the manner complained of by nearby residents.

Vice Chancellor Stein reviewed the suit in New Jersey Chancery Court, and held after visit to the scene that the alleged nuisances complained of existed and should be enjoined.

The quarry concern, under terms of the injunction as made public, was "perpetually restrained" from the following: blasting so as to jar, shake or vibrate dwellings of complainants or cause stones to be cast on their premises or cause such noise as will occasion a nuisance; operating rock crusher, steam engines, drills and other machinery with such noise as to cause a nuisance; dropping crushed rock from bins into trucks or dropping rock into hopper with such noise as to cause nuisance; sounding steam whistle; manufacturing and selling "Kern-O-Mix" or similar products upon the quarry lands.

A provision permitted the operating of the mixing plant for three months to give the company opportunity to find another location for it. The quarry operators also were allowed three months "to make necessary changes or alterations to their crusher, hopper, bins, steam engine and other quarry machinery, rock loading methods and drilling methods to eliminate, if possible, the noises complained of."

It was testified by residents in the vicinity that the quarry blasting caused their houses to vibrate, foundations, ceiling and sidewalks to crack and made such noise as to frighten and disturb them.

"Noise and offensive odors," the court held, "even when not injurious to health, may constitute a nuisance if they render the lives of complainants uncomfortable."

Referring to a municipal permit from South Orange for use of explosives at the quarry, the court said this permit "does not justify the use thereof in such manner as to constitute a nuisance. It is beyond the power of a municipality to authorize the maintenance of a nuisance."

"Although defendants have an undoubted right to quarry stone on their property," the court added, "the complainants enjoy the right to the undisturbed use and possession of their houses. If those rights conflict, the right of defendants to operate the quarry must yield to the latter, which, in the eyes of the law, is the more important of the two.

"A nuisance may be merely a right thing in a wrong place.

"Carrying on an offensive trade for 20 years, in a place remote from buildings and public roads, does not entitle the owner to continue in the same place after houses have been built and roads laid out in the neighborhood, to the occupants of and travelers upon which it is a nuisance."

—Bethune Jones

• **Flying particles of rock during "skull-breaking" operations are often dangerous. This crane operator has protected himself by placing a ¼-inch screen over the front of the machine's cab. The idea was used on the Guthrie-Marsch-Peterson section of the Pennsylvania Turnpike.**

• **Hard rubber or composition insulator insets afford a safe and convenient support for extension cords around the shop or machine.**

Safe Light Cord Holder

When making use of the common light extension about the shop or on the machine, particularly the boom, it is both dangerous and rough on the soft rubber insulated cord to leave it on the floor where it may be subjected to any number of accidents.

In order to safely reach the many locations and places necessary to work, the cord should be secured or held at a level so that it will not pull on the light itself. When making up a cord, slip a common hard rubber or composition aerial washer or insulator over the rubber cord as shown before connecting up the light or socket connection.

The insulators used should be taken out of the wire hook in which they are encased with a care in order not to damage them. The inside of the insulator is perfectly smooth and rounding or flared from both sides, while the outside of the piece is grooved like a pulley affording a place to tie the cord, rope, or wire used to suspend the light cord.

The extension cord can be roughly pulled through these insulators without damage, and slips back and forth readily to accommodate wiping or coiling operations.—*Frank Bentley*

There are 301 highway trade barriers between the United States.

Alexander King

NEWS of the death of Alexander King, general superintendent in charge of Oliver Iron Mining Company's operations in the West Mesaba district, comes as a sad blow to his many friends throughout the industry. Mr. King, who had been active on the Iron Range for 41 years, died at his home in Coleraine, Minnesota, on April 21 at the age of 57 after a three month illness.

Born in Negaunee, Michigan, Alexander King graduated from the Virginia high school and after spending a year at the University of Minnesota he received his degree at the Colorado Mines School at Golden, Colorado. This was followed by a long and varied career in the service of the Oliver Iron Mining Company, first as a chemist, then as superintendent of the Holman mine at Taconite and director of operations in the Chisholm area.

Strong of character, yet friendly in manner, Mr. King was a prominent figure in the civic life of his state. Numerous communities felt the influence of his good citizenship qualities. His record as a mining man is a credit to an industry that will long remember his sincere, earnest nature. Loyal to a fault, Alexander King's friendships were deep and lasting associations and valued greatly by those who knew him.

His varied fraternal activities included membership in the Masons, the Knights Templar, and the Benevolent Order of Elks.

Mr. King is survived by his wife; his father, Henry King; five children, Janet, Chicago; Marjorie, Oshkosh, Wis.; Alexander, Jr., West Allis, Wis.; Bruce, Boston, and Jack, Philadelphia; two sisters, Mrs. Jay Ray Fitzgibbons, Coleraine, and Myrtle, Chicago; one brother, Ellard, Los Angeles.

Eric P. Ericson

DEATH claimed another loyal employee of the Oliver Iron Mining Company when Eric P. Ericson died on April 28 at the age of 57 in his home at Hibbing, Minnesota, after a brief illness. His death marked the end of 35 years of loyal and capable service to a company that will long miss his ability.

Mr. Ericson was born in Rodon, Sweden, on February 5, 1884. He entered the United States in 1895 and became a naturalized citizen. His education in America was completed by attendance at grade and high schools climaxed by 2 years at Gustavus Adolphus College.

Starting with the Oliver Iron Mining organization in 1906 as a timekeeper in the Mt. Iron mine of the company's Virginia district, Mr. Ericson served this same district in the capacities of warehouseman, pit foreman, and foreman. His strength of character and ability made him of increasing value to his company as a leader of men, and in 1919 he was made general foreman of the Hull mine at Hibbing, Minnesota. Continued success in his work resulted in his being appointed general pit foreman of the Hull-Rust mine in the Hibbing-Chisholm district in 1937 in which capacity he served the company until February, 1941, when he was made supervisor of production of the Hibbing-Chisholm district.

Mr. Ericson's record of service and advancement reflects the love of a man for his work. Although many men in the industry knew him as a loyal and devoted worker, his friendships, once made, were loyal and constant.

Eric P. Ericson's love for his work was second only to his devotion to the family that survives him. His wife, Ellen, and three children, a son, Maurice, and two daughters, Frances and Mildred have suffered a loss that can never be balanced.

(Obituaries continued on page 354)

EXCAVATING ENGINEER
FOUNDED 1908

A Monthly Publication

Devoted to the Excavating Industry

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Song of the Builders

Building things has always been the symbol of good times in America. Streets torn up, new pipes being laid, steam rollers pressing down asphalt paving, concrete mixing trucks on the march, the song of the hammer and the machine-gunning of riveters, interested spectators watching an excavation crew as entranced as a theatre audience—all these are familiar vitamins at work rejuvenating the body economic.

"A good country if they ever get it finished" was an English visitor's remark after witnessing everywhere he went that perpetual tearing down and building up in American cities and towns. But we don't want to get it finished. That would be the beginning of stagnation. Creation, building, improving — these are the secrets of prosperity and the zest of life.

Construction is not an industry but many industries. It ranges from the hydro-electric dam contractor to the plumbing shop, from sawmill to lumber yard, from architect to painter. When the construction industries mend, everything looks up. Only agriculture and merchandising exceed construction in number of people gainfully engaged.

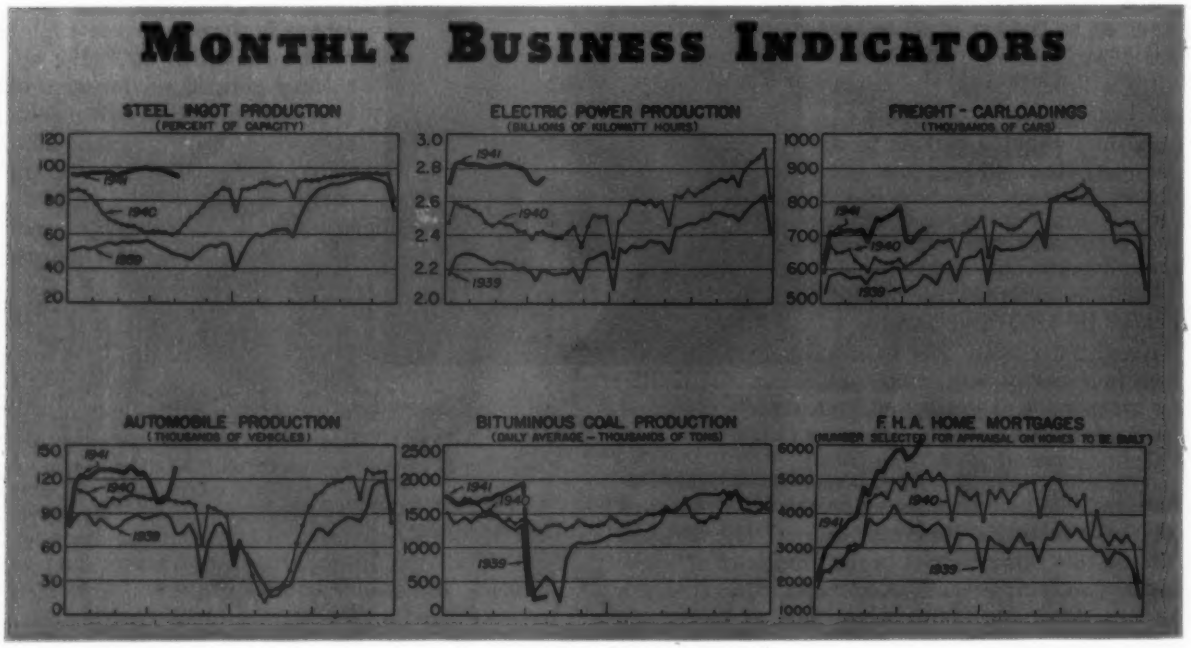
Recognizing the importance of construction, government has tried various means of stimulating it. Some of these efforts, such as the Federal Housing Administration and the Federal Home Loan Bank Board, have been helpful, others socialistically inspired. But benefits from this source are bound at best to be limited. The job is too big, too difficult for government. It can only be done through the tremendous force exerted by private initiative released from the restraints of fear.

Only through the contract system can America put to effective use the skill and knowledge of its contractors. Competitive bidding, foundation of the contract system, assures economical and competent completion of defense as well as peacetime projects.

For 1941 construction has the immediate task of performing a $2,500,000,000 hurry-up job that is preliminary to the real organization of the nation into a first-class military power. This may equal anything demanded of industry in the Kaiser's war. During its progress every industry that contributes to building will strain its utmost for quantity production. For the time being they are concentrating on it as the first order of business.

But construction leaders warn each other and the public that this emergency building is at best only temporary. They know that when the tumult and the shouting are over there will follow a relapse unless private construction can take up the slack. Nor do they expect to wait until the last shot is fired in Europe and freedom established for all the peoples of the earth before tackling that great work. They will carry on and endeavor to bring to reality a vast building program that will catch up an accumulated shortage and obsolescence of staggering proportions in residential housing, industrial plants, and highways and other public facilities.

For stepping into this breach and leading the way to better times, construction is well prepared. It confidently offers more value in a modern home than ever before. Advances in what makes for comfort in homes have been at such a pace that more equipment is packed into a five-room house today than in a seven-room house only five to ten years ago, and without any hint of crowding. Homes costing $6,000 now may have two bathrooms.



Even a home at $3,000 is today a very modern structure which can be purchased by a man of modest means on a monthly payment basis without the old costly abracadabra of notes and mortgage refinancing at intervals.

It is not unusual now to find operative builders and building material merchants who are selling the home owner the complete job even to seeing that tax payments are included in the monthly installments.

Equally revolutionary are some of the developments and possibilities in factory construction. The new factory is a thing of beauty on the outside and of smooth-flowing efficiency on the inside. Windowless, atmosphere - controlled plants, noise-absorbing, free of pillars, and elevators and with three times the production capacity of yesterday's structures are among the new marvels.

In changing the face of nature, modern technology has provided constructors with astonishing power to move mountains, bridge long stretches of water, tunnel under the great rivers and lay down a network of paved roads that in magnitude completely dwarfs the engineering feats of railway building. Beside these performances the seven wonders of the ancient world seem like the playthings of immature men.

There is every reason for pride in being a "builder." These men have wrought well. They will build even more stately mansions in the years to come.

Residential Contracts Increase 38%

Residential contracts awarded during April 1941 in the 37 states east of the Rocky Mountains were, according to F. W. Dodge Corporation, highest since July 1929. The volume of April awards amounted to $166,462,000, an increase of 38 per cent over April 1940 chiefly because of the activity in the building of one- and two-family houses.

As a result of this volume of residential building, 34,780 dwelling units were provided, while in the corresponding month last year only 27,418 were produced. Private-ownership construction, comprising 83 per cent of the total, continues as the dominant factor in residential building.

All building and engineering contracts awarded in April totalled $406,675,000, 35 per cent greater than the volume of $300,504,000 awarded in April last year. While April is 15 per cent below March, the decline can be attributed primarily to a 25 per cent decline in public-ownership construction due to an abnormal amount of defense work included in the March figures.

"We make more money from the fish than we do from the gold in these diggings!"

Put State Highway Planning Survey Material to Use!

Recent reports indicate a growing concern in many highway user circles that the material gathered through the state highway planning surveys may not be used to the greatest advantage of motor vehicle owners generally. It is felt by many persons of national prominence among highway users that state organizations should interest themselves in the findings of these surveys and should set about to formulate long-term rational highway plans for their own states.

As a result, efforts have been underway for some time to formulate some type of guide for use by state groups in studying highway planning material and in constructing future plans. The very nature of these surveys with their many ramifications makes the drafting of such a guide essential in order that highway users may get important information at a minimum of trouble. Otherwise, it may be necessary to wade through a great mass of data to secure needed facts.

In the meantime, some national organizations are advising their state affiliates to consult with highway planning officials in studying survey results. It is quite possible that such study and planning may become a part of the major activities of state highway user groups within the near future.

The highway planning surveys are now being conducted by highway departments in all forty-eight states in cooperation with the United States Public Roads Administration. They are assembling a wealth of information on highway transportation. The surveys are broken down into three major subjects: Inventory, Traffic, and Financial or Economic. With the information available under these classifications, state highway user groups are in a better position than ever before to work out intelligent answers to many perplexing questions.—Highway Highlights.

Wanted: Back Copies

To complete office files, Excavating Engineer would like to buy (or borrow for photostat purposes) back copies of its forerunner "Steam Shovel News" from April, 1907 to July, 1910 inclusive. If you have copies of any or all of these issues, please drop a post card to Excavating Engineer, South Milwaukee, Wisconsin.

Equipment

you ought to KNOW ABOUT

Four-wheel scrapers

Manufacturer: Bucyrus - Erie Company, South Milwaukee, Wisconsin.

Claims: Designated as S-152 (13½-yd.) and S-45 (4-yd.). Both new models feature the simplified design of Bucyrus-Erie scrapers which has reduced the number of main parts to but five—(1) frame with sideplates, (2) tilting bowl, (3) apron, (4) tongue assembly, and (5) rear axle assembly. These features materially reduce dirt-moving costs by lessening chances for breakdowns and time losses, keeping maintenance costs at a minimum, and simplifying operation. Two-line cable control, with one line regulating digging edge height and the other controlling apron opening and tilting of the bowl, gives accurate control over

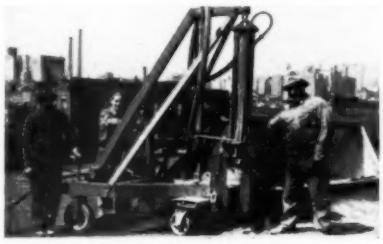
depth of spread and digging. The sharp angle of the bowl bottom in dumping position, plus its scraping action against the sideplates, virtually eliminates adhesion of material in dumping. Cable is kept free of twisting bends; a minimum number of sheaves is employed, and those used are all set in a vertical plane along the center line of the scraper. All sheaves are of large diameter, are roller-bearing mounted, and are duplicates and interchangeable. The efficient cutting edge angle remains unchanged while digging, and a practically constant wheel-base is maintained to keep a uniform straight-line pull from the tractor drawbar to the cutting edge. Equipped with the exclusive double curve cutting edge. Higher loading speed with minimum drawbar pull results from the boiling action produced with this type of blade. A standard flat-type blade is also available for special materials and conditions. Fast hauling is made easier by the practically constant wheel-base which maintains even distribution of the load during the entire cycle. Low center of gravity plus wide wheel spread assures stability, loaded or empty, and faster round-trip schedules are safe and easy because compact design permits short non-stop turns.

For further details about the equipment on this page please write to the manufacturer, mentioning Excavating Engineer.

Concrete breakers

Manufacturer: The Rapid Pavement Breaker Corporation, 607 Degraw Street, Brooklyn, New York.

Claims: Pneumatically controlled. Efficient in breaking of concrete floors in buildings, roads, trenches, etc. The 210 ft. compressor can be left in the street or just outside a building and the machine moved around wherever needed inside the building. The push type is handled by three men, hammer operator and two helpers. All four wheels on this device swivel to allow the machine to travel in any direction. Weighs 1,000 pounds, eight feet six inches in height, four feet wide and seven



feet long. Can easily be towed behind any light truck or truck mounted compressor. The other model is designed for building or street work. Running gear on this machine is similar to an automobile's, propelled by an air motor, boom is longer and made to swivel, requires two men to operate. This unit weighs about 1,400 pounds, is eight feet six inches high, seven feet six inches wide and ten feet long. Preserves beams when stripping those encased in concrete. Develops a cutting speed of five hundred lineal feet per hour on reinforced concrete eight inches wide. It can cut trench, break frost up to ten inches and also be used in tamping.

Industrial wheel tractors

Manufacturer: International Harvester Company, 180 North Michigan Avenue, Chicago, Illinois.

Claims: Five new wheel tractor models. They are designated as the "I" line and include three models with carburetor-type engines and two with full-diesel engines. All the five new tractors

have Tocco-hardened crankshafts, pressure lubrication, replaceable cylinders, five forward speeds up to 15 miles per hour (except the I-6 and ID-6 which have five speeds up to 14 miles per hour), gear drive, countershaft brakes that can be individually controlled or interlocked, provision for mounting a variety of allied equipment, and various other features. The three tractors with the carburetor-type engines are respectively designated as Models I-4, I-6, and I-9. The engines are of the four-cylinder, valve-in-head type. The two new diesel-powered tractors are respectively designated as the ID-6 and ID-9 and in dimensions and other characteristics, excepting engines, are similar to the I-6 and I-9. The diesel engine of each tractor not only uses low-priced fuel but also uses much less fuel than a conventional engine of the same size. It starts as a gasoline engine and is quickly

10 QUESTIONS to ask a SPREADER SALESMAN

1. Will your spreader put down with almost absolute uniformity (98-99% accuracy on many jobs) everything from a fine sprinkle of sand to a 1½ inch layer of stone?
2. Will it do this regardless of truck speed?
3. Will it operate in reverse equally as well as forward?
4. Will it taper the spread—thick on one edge, thin on the other?
5. Will it automatically cut off flow of material, without a dribble, when spreader stops?
6. Will it handle wet or slightly sticky material equally as well as dry material?
7. Will it spread strips of various widths?
8. Can one man quickly couple or uncouple it from the truck?
9. Can it be put in "neutral," that is can the distribution of material be stopped easily by a lever control while the spreader is in motion?
10. Will it spread close to roadside obstructions or close to the shoulder without riding on the shoulder?

. . AND HERE'S THE *Answer*

THE answer to every one of these questions is: "YES, if it's a BUCKEYE Spreader!" This machine is second to none for accurate, low cost spreading. It saves 20% and more on labor and material, is easily operated and speeds up production. Spreaders are built in widths from 8 to 13 ft. A strikeoff attachment is available for spreading courses of heavy stone up to 6 inches in depth.

Before you buy a spreader be sure to get a copy of the 8 page bulletin on BUCKEYE Spreaders. It shows you in detail the mechanical features of the machine, tells what users have to say about it. Read it, and then judge for yourself. Write today!

BUCKEYE TRACTION DITCHER CO.
Findlay, Ohio

See Page 325

Built by Buckeye

Convertible Shovels

Trenchers

Tractor Equipment

R-B Finegraders

Road Wideners

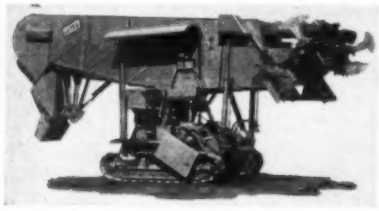
Spreaders

converted to full diesel operation by means of a lever within easy reach of the driver. The five new International industrial wheel tractors are capable of operating a variety of equipment in their power range.

Hydraulic lift loader

Manufacturer: George Haiss Manufacturing Company, New York, New York.

Claims: Hydraulic lift mechanism replaces the usual handwheel operated device for raising and



lowering the digging end of the elevator, either for setting the digging level or lifting the elevator to a horizontal position for travelling. Made to meet the problem of elevating the discharge chute to load over the high sides of a 20 cu. yd. truck body because the chute's clearance is only 13½ ft. with a 45° angle setting. Two hydraulic cylinders are used, one mounted on either side of the elevator. Control is via a two-way valve located at the operator's platform. A spring return to neutral affords a satisfactory factor of safety.

Portable air compressors

Manufacturer: Ingersoll Rand Company, Phillipsburg, New Jersey.

Claims: Known by the trade name "Mobil-Air." Reduces average fuel costs up to 40% compared

to previous I-R models. Engines convertible from gasoline to oil or from oil to gasoline operation by making a substitution of fuel accessories and without changing heads or pistons. The result is being able to take advantage of the lowest fuel cost prevailing in the operating area. Uses a Waukesha multi-fuel engine built to type specifications. Patented drillmore, multi-speed regulator which automatically adjusts the engine speed to the use of air and practically eliminates wasteful idling while air is being used. Weighs up to ⅓ less than previous models. Available for users interested in operation of fuel oil only is the 315-cfm size with the International Harvester UD-18 full-diesel engine. Unique device provides easy starting on gasoline without the use of high-voltage batteries, extra starting engines, etc. This model is not convertible to operation on gasoline or natural gas.

For further details about the equipment on this page please write to the manufacturer, mentioning Excavating Engineer.

Large capacity tractor-trailer combination

Manufacturer: Six Wheels, Inc., 1572-1584 East Twentieth Street, Los Angeles, California.

Claims: One of the largest combinations of this kind ever placed on the market and adapted for extra large loads, especially where the haul is "off the road." The TriPull tractor has speed ranging from 2 mi. per hour in low, up to 30 mi. per hour in high gear, with sprocket sizes available for every speed and load-hauling situation. It also has DBP of over 43,000 lbs., and is equipped with a motor developing 225 H.P. on diesel fuel. Butane or gasoline equipment optional. Three distinct hauling jobs may be performed by the TriPull tractor—hauling the Maxi Muck Mover trailer, handling any large carryall type scraper or carrying an extremely large dump body on its back—hence the name TriPull. The Maxi Muck Mover trailer has a bottom dump body 18 ft. by 9 ft. 4 in. at the top and 6 ft. deep with a capacity of 25 cu. yds., water level, and 40 cu. yds. heaped, and weighs 22,500 lbs. The rear end is carried on two walking beams, equipped with 18x24 in. tires. Overall length of the tractor and trailer is 48 ft. and the total weight 25 tons. "Fluid drive" or coupler is mounted between the engine and the regular clutch. The drive axles are 6 in. diameter chrome molybdenum, heat treated, fitted with Timken bearings and the final drive is a dual chain with a separate chain to each drive wheel. Equipment includes Westinghouse air-operated brakes with slack adjusters 18x10 in. on all drive wheels; American Blower

Model 21 hydraulic coupler; tubular core radiator with extra large cooling capacity, and Ross cam and lever type steering with Garrison boosters which assist the driver in guiding the tractor with little effort on his part. Briggs clarifiers on oil and fuel systems are standard equipment on the Maxi power unit. The tractor is available for longer wheel bases and on dual tires for operations requiring the load to be carried on its back. TriPull tractor's gross capacity on dual tires is 150,000 lbs.

Wagon drill and portable compressor

Manufacturer: Sullivan Machinery Company, Michigan City, Indiana.

Claims: The drill mounts 55 to 75 lb. hand rock drills and increases drilling footage 50 to 80 per cent over hand operation. Pneumatic tired, convenient to handle and drills at any angle. An independent air motor operating the feed gives wide range of pressures with ample power for pulling steels. Wagon drills are built in light, medium and heavy weight models with 4 ft., 6 ft. and 10 ft. steel changes.

The compressor is a compact, quality built unit. This two-wheel pneumatic tired model tows conveniently behind a passenger auto at regular traffic speeds. It is built for one-man handling and can be operated by the drill runner. The skid type can be set in a pick-up truck, leaving ample room for drills and other equipment. Built in 105, 85 and 60 cfm. It is air cooled, single stage, with streamlined air passages, full force feed lubrication, lifetime main bearings and electric starter.

EVERYBODY knows that the Diesel engine costs you less to run. The big thing, though, is this: A "CATERPILLAR" DIESEL CAN SAVE YOU MORE THAN THE USUAL DIESEL!

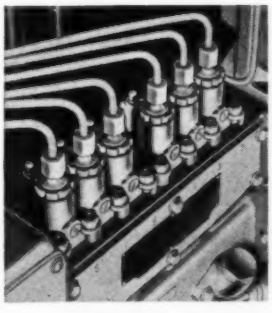
This is because "Caterpillar's" exclusive fuel system—and the method of fuel injection and pre-combustion of fuel—permit you to run on such *lower cost* fuel as No. 3 furnace oil generally used for household oil burners!

The average cost of such fuel is about 2c and more a gallon *below* that of the usual "high-speed" Diesel fuel. In 10,000 hours, therefore, a 100-horsepower "Caterpillar" Diesel can give you *all* the ordinary Diesel savings—with an *additional saving* of approximately ONE THOUSAND DOLLARS!

This is one example of the dollars-and-cents difference between Diesel economy and "*Caterpillar*" Diesel economy. Other sizes of "Caterpillar" Diesels effect these additional savings in proportion to their horsepower and their fuel consumption per hour. Write us about your work and its requirements—and let us estimate the difference a "Caterpillar" Diesel can make in your power costs!

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS

"Caterpillar" Diesel Tractors are available in sizes from 25 to 113 drawbar horsepower. • "Caterpillar" Diesel Motor Graders are available in three sizes. • "Caterpillar" Diesel Engines are available in sizes from 34 to 190 maximum horsepower.



HERE IS ONE IMPORTANT DIFFERENCE

Inside this housing is the exclusive "Caterpillar" Diesel fuel system. Individual pumps supply fuel to each cylinder *and no mechanical field adjustments are ever necessary!* These pumps are interchangeable and easily replaceable—made of high-quality material selectively hardened for maximum wear and machined to a perfection of fit unexcelled in the Diesel industry. These pumps are designed and built by "Caterpillar" and serviced by "Caterpillar" dealers in any locality. The simplicity, long life and trouble-free performance of this assembly is interesting proof of the fact that *there is a difference in Diesel economy!*

MORE MONEY SAVED HERE

Follow the yellow line from upper left downward. "Caterpillar" pumps supply fuel under pressure to the injection valve which automatically unseats to shoot an atomized spray of fuel into the cylinder. No mechanical operating adjustments here, either—and another "Caterpillar" precision-built assembly! The design of the injection valve assures continuous conditioning of even the heavier, lower cost fuels which are further prepared for combustion by the pre-combustion chamber. In this chamber (shown below valve) the spray of fuel is changed into a hot swirling gas. The fuel in this gaseous state passes into the cylinder where additional air is available to complete the combustion and the power stroke. The design of this system enables the use of low-cost fuels and assures efficient operation.

CATERPILLAR DIESEL

REG. U.S. PAT. OFF.

ENGINES AND ELECTRIC SETS • TRACK-TYPE TRACTORS • ROAD MACHINERY

Shots from the FIRING LINE

Millionth Yard of Concrete Poured at Shasta Dam

The millionth cubic yard of concrete has been poured in Shasta Dam on the Central Valley propect in California, according to John C. Page, commissioner, Bureau of Reclamation.

Although only one-sixth completed on May 3 when the millionth yard of concrete was placed at 2:27 p.m., Shasta Dam already contains more concrete than any other structure in California. The largest completed concrete dam in the state is Hetch Hetchy with 935,000 yards.

Shasta's 1,000,000 yards of concrete in place, weighing about twice that many tons, make it virtually as large in volume as Norris Dam in Tennessee which contains 1,015,000 yards, and far larger for example than Bonneville Dam on the Columbia River which contains 596,000 yards. When completed across the Sacramento River north of Redding, Shasta Dam with 6,000,000 cubic yards of concrete will be the second largest concrete structure ever built by man, exceeded in mass only by Grand Coulee Dam in Washington.

Shasta Dam is the principal feature of the vast Central Valley project which will aid inland navigation, help control floods, and furnish water and power to agriculture, industries, and cities in northern and central California.

Work has been underway on Shasta Dam for more than 2½ years. Construction was started on September 8, 1938. The first concrete was poured less than a year ago—on July 8, 1940. The dam is expected to be completed late in 1943 or early in 1944.

Water for the irrigation of the Gila project will be diverted from the Colorado River at Imperial Dam, approximately 300 miles downstream from Boulder Dam. About 33,000 acres of land in the Yuma Mesa Division is public land which will probably be opened for settlement within two or three years.

New Tacoma Narrows Bridge May Be Four-Lane Structure

Advices from Tacoma, Washington, indicate that when the Tacoma Narrows Bridge is rebuilt, it will be a four-lane structure instead of two. The new bridge will be heavier; for it appears that the answer to the aerodynamic problems of the wind in the Tacoma Narrows is to build the bridge heavy enough so that the wind will no longer be a problem. Bridge experts in studying the collapse of the bridge last November assert that it may have been the result of a long, gradual engineering trend toward lighter and cheaper suspension bridges and that while such bridges would safely bear the loads, they may have overlooked the wind factor. It was discovered, ironically, more than 100 years ago an early suspension bridge over the Menai Straits in England had twice been wrecked by wind and that the periods of oscillation of this bridge were almost the same as those of the Narrows Bridge.—Highway Highlights.

• This recent air view of Shasta Dam taken from the top of the 460-foot cableway tower on the west bank of the Sacramento River shows the progress of concrete placing operations.

Complete Part of Blue Ridge Parkway

Blue Ridge Parkway is finished and open to traffic in the section from Adney Gap near Roanoke, Virginia, to Deep Gap near Blowing Rock, North Carolina, according to reports received from Newton B. Drury, Director of the National Park Service.

When completed, the Parkway will connect Shenandoah National Park in Virginia with Great Smokies National Park in North Carolina and Tennessee.

This opened section covers a distance of 140 miles. The full parkway will stretch 485 miles along the crest of the Blue Ridge mountains and connect two of the most extensively used national parks in the system. Its average altitude will be 3,000 feet above the sea.

Numerous parking overlooks provide safe points from which to view at leisure the country spreading below. For the continuous length of the parkway these varying roadside panoramas are protected by park-owned right-of-way averaging 800 feet in width, free from billboards and other increments of the usual commercial highway. Use of the parkway is restricted to passenger vehicles.

Construction on unfinished sections of the parkway continues at various stages. Work is now in progress on a 54-mile unit between Rock Fish Gap, Virginia, and where the parkway crosses U. S. Route 60; a 34-mile section south of the James River in Virginia; the stretch between U. S. Route 421 and Thunder Hill Gap in North Carolina; 13 miles near Mount Mitchell in North Carolina; a section southwest of Asheville near Mount Pisgah; and a 6-mile section near Soco Gap. It is expected that these several sections will be completed between August 1941 and November 1942. As grading projects are finished, the units will be opened to traffic on the usual "drive at your own risk" basis. When the 13-mile section near Mount Mitchell is graded, it will complete a 70-mile unit from Grandfather Mountain to Asheville. Paving of a portion of this unit is now under way.

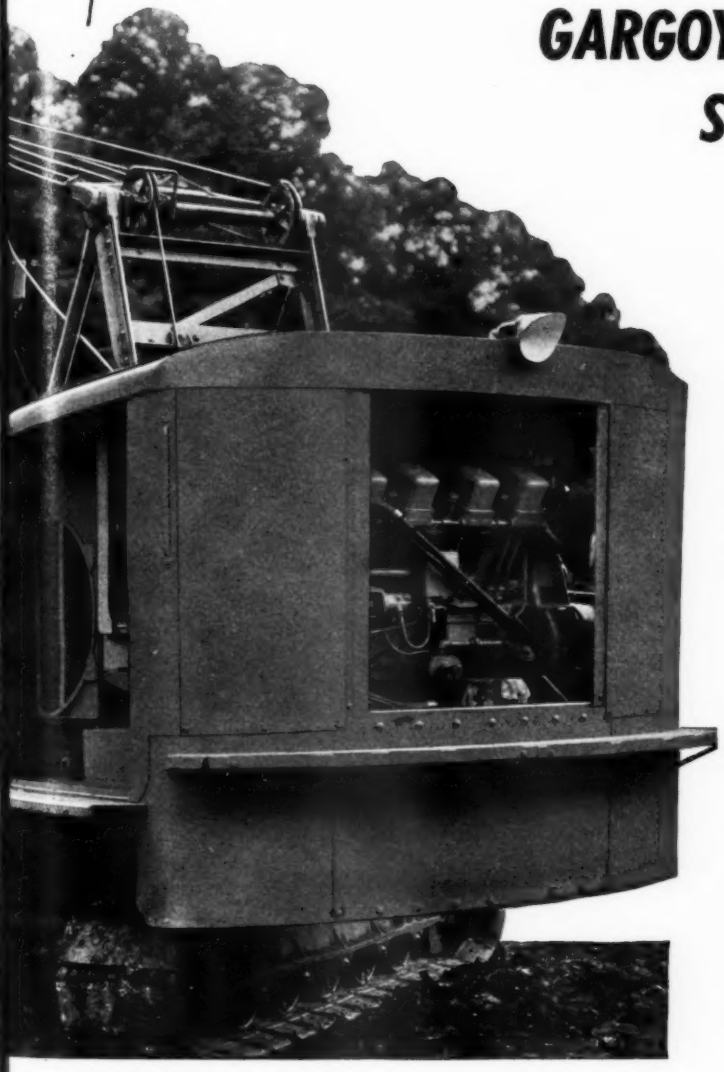
President Recommends $20,000,000 for Inter-American Highway

On May 1 President Roosevelt transmitted to congress a report recommending an appropriation of $20,000,000 to enable the United States to cooperate with the governments of the American Republics in Central America in the survey and construction of the proposed Inter-American Highway at least as far south as the Panama Canal. It is pro-

(*Continued on page 354*)

Shine_

GARGOYLE VISCOLITE OILS STICK ON THE JOB!



THE WEATHER MAN is a tough customer, but Gargoyle Viscolite Oils are tougher!

These sturdy oils stay put in bearings and gears on stormy days . . . flow freely on cold starts.

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Shots . . .

(Continued from page 350)

posed that the United States would pay two-thirds of the costs of the highway in each of the countries through which it would run and the interested local government would contribute at least one-third.

The principal reasons given as to why it is considered desirable for the United States to make a direct contribution in the completion of the Inter-American Highway are given as follows:

1. Improved transportation within and between the countries of Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua and Panama and the United States.
2. Development of new lands and natural resources, and increased consumption of American imports.
3. Increased employment and maintenance of economic structures.
4. Increased tourist traffic.
5. Increased market for American automobiles, parts, garage equipment, etc
6. Defense value.
7. Almost entire appropriation to be spent in the United States.

Commenting on the defense value of the Inter-American Highway the report states that the U. S. War and Navy Departments believe that a through highway from the United States to the Panama Canal would be of real value from the standpoint of the defense of the Caribbean area. Another important consideration is the importance of political stability in all the countries of the Western Hemisphere at this time which in turn is largely dependent upon the maintenance of economic stability.

The proposal includes that section of the Inter-American Highway approximately 1,550 miles in length which reaches from the Panama Canal to the border between Guatemala and Mexico and passes through the principal cities of every Central American country except Honduras. Upon completion, the highway would provide direct communication by road from Laredo, Texas, to the Canal Zone.

Frederick Richard Wedlake

Frederick R. Wedlake, master mechanic in the Virginia-Eveleth district for the Oliver Iron Mining died unexpectedly on April 29 after an illness of short duration at the age of 53 in his home at Virginia, Minnesota.

Quiet and unassuming, Mr. Wedlake was a master craftsman in his chosen vocation and constantly kept abreast of the developments in his field. Born in St. Austell, Cornwall, England on November 13, 1887, Mr. Wedlake entered the United States in 1909 to become a naturalized citizen.

His 32 years of service with the Oliver Iron Mining Company started in 1909 when he was employed as a carpenter helper at the company's Gilbert mine in the Fayal district. A conscientious worker, Mr. Wedlake rose through the ranks of pipeman and assistant master mechanic to the master mechanic position he held at the time of his death.

Frederick Wedlake is survived by his wife, Maud; two daughters, May and Mary; and a son, George.

Clarence K. Boyce

Pitched from the trailer of a runaway truck on a hill on Route 33, five miles east of Batavia, New York, Clarence K. Boyce, 36-year-old employee of the Genessee County Highway Department met instant death on April 26.

Mr. Boyce was employed as a crane operator by the highway department and was on his way from a project near Alabama to the Circular Hill Road in the town of LeRoy when the seven-ton county truck hauling the trailer and its cargo of a 16-ton crane overturned and the crane toppled off the trailer into a field.

Clarence K. Boyce was a native of Corfu. Surviving are his widow, Eunice Bower Boyce; a son, Carl; his mother, Mrs. Matilda Stawlbush Boyce of Batavia; three brothers, George W. and John R. Boyce of Batavia, and Clayton of Oakfield; three sisters, Mrs. J. Coe Kennedy of Batavia, Mrs. Harry Hotchkiss of Oakfield and Mrs. John Coakley of Rochester.

China Clay Sales Continue Rise

Continuing their almost-uninterrupted uptrend since 1921 sales of kaolin or china clay by domestic mines rose in 1940 to another new record of approximately 825,000 short tons valued at $6,844,000 compared with 780,804 tons worth $6,200,606 in 1939, according to the Bureau of Mines, United States Department of the Interior. Imports, virtually all from the heavily bombed channel ports of southwest England, declined only moderately to 105,566 tons having a nominal value of $870,421 compared with 114,696 tons valued at $1,015,813 in 1939.

Further expansion of demand for American paper clays—both for coating and filling paper—accounted for most of the increased sales reported to the Bureau of Mines by clay miners. Substantial gains occurred, however, in sales of high-grade clays to pottery manufacturers and of lower-priced clays for refractory purposes. Of the total quantities sold or used, the paper industry consumed almost 60 per cent, 11 per cent was used in rubber, another 11 per cent went to pottery and tile manufacturers, 8 per cent for refractories, nearly 5 per cent in cement, and the remaining 5 per cent was distributed among a variety of uses of which paints, linoleum and oil cloth, alum, and miscellaneous filler applications were of chief importance in the order named.

Georgia contributed 68 per cent of the tonnage in 1940, a slightly larger proportion of the total than usual, but South Carolina's share declined fractionally to 18 per cent of the total. North Carolina, while contributing less than 2 per cent of the tonnage, showed a notable increase in production which is more significant in view of the high value per ton of North Carolina clays which are much better prepared than formerly and much more readily accepted by pottery and tile manufacturers who have been less inclined than the paper makers to follow the trend of substituting domestic for foreign clays. In the ceramic industry American clays are not an interchangeable substitute for English clays which so long have dominated this field but it is generally admitted that virtually any desired quality of ware can be duplicated by using all-domestic materials in properly designed batch formulas.

Price quotations for domestic clays have remained virtually unchanged for several years and readjustments of English clay prices largely reflect changes in ocean freight. The increase in the average value of domestic sales from $7.94 a ton in 1939 to $8.28 in 1940 reflects a larger proportion of the higher-grade clays rather than a general rise in prices.

Rhode Island Licenses Operators

By Bethune Jones

Rhode Island excavating engineers will be placed under state regulation through the terms of a bill providing for examination and licensing of hoisting engineers, which was given final legislative approval just prior to the termination May 1 of the 1941 session of the Rhode Island Legislature. Similar legislation had been unsuccessfully proposed in Rhode Island during the last five years.

The measure authorizes the state department of labor to examine and license hoisting operating engineers of steam, gasoline, diesel, electric and compressed air powered machinery, with the chief of the division of indus-

"TOUGH, FAST *and* RANGY"

Just what they wanted for Denison Dam

TOUGH ➡ to keep going steadily and avoid costly delays on this big 22,000,000 yard excavation project on the Red River in northeast Texas. No time to "baby" unreliable equipment in Guy F. Atkinson's organization.

FAST ➡ in the bank, on the swing, and into the trucks — fast too on the move and easy on the operator. You need big yardage producers to tackle big jobs like this — the 120-B has a world-wide reputation for big output and lives up to it.

RANGY ➡ 22 foot dumping height and 46 foot cutting radius (maximums) meant saving cuts, working at maximum efficiency. Any experienced shovel man can recognize the trim rangy lines of the famous 120-B as far as he can see it. You can tell that every pound of high test steel is where it counts most for strength and performance.

That's why Guy F. Atkinson Company bought two five-yard 120-B's for Denison Dam. And these two 120-B's are just two of the reasons why this job is one of the country's "show" jobs for efficiency and performance.

Bucyrus·Erie

SOUTH MILWAUKEE, WISCONSIN

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trial inspection in the department to supervise examining and licensing.

The state director of labor is required to make suitable rules and regulations for the examining and licensing procedure.

The bill provides that after July 1 no person can operate or be in direct charge of a hoisting or excavating appliance of the types specified, of five horsepower or more, without a license, and no use of such equipment by unlicensed engineers can be permitted.

The fee for applying for a license, under the bill, is $5, with renewals costing $2.

Exemptions are provided in the act for federal engineers, public utility engineers or operators, truck capstans and hoists powered by the truck motor, agriculturists, fishermen, horticulturists and all engines except those operating a "hoist, shovel, crane, or excavator."

Persons engaged in the operation for a year prior to passage of the act can be licensed without examination, the bill stipulates.

Deputy Minority Leader John G. Murphy told the House, when the measure was before that body, that the bill is designed to apply chiefly to highway and construction work.

Bullshead Dam Proposal

By F. N. Hollingsworth

A great irrigation and multi-purpose power dam is being planned by the Bureau of Reclamation on the Colorado River, 67 miles downstream from famed Boulder Dam. Already named the Bullshead Dam, estimated cost of the project is $41,200,000, $5,000,000 of which congress has been asked to start the project. The dam will supplement Boulder and Parker Dams on the same river, providing additional power for the Pacific Southwest, as well as conserving water for irrigation. It will be an earth-fill structure 338 feet high, with a heavy rock facing on the downstream side, and will create a reservoir with a live storage capacity of 1,600,000 acre feet, or over 500,000,000 gallons of water.

Operation of the dam will be synchronized with Boulder, Parker and Imperial Dams, smoothing out fluctuations in the Boulder power plant. In years of low runoff of the Colorado River, the entire annual stream flow released at Boulder from the Lake Mead reservoir will be caught by Bullshead and used for power generation, giving a steady, continuous output. Transmission lines will connect Bullshead with the Parker plant and serve commercial load centers at Phoenix, Tucson, Yuma, the Gila project in Arizona and the Imperial and Coachella valleys in southern California.

Ohio's Road Program Growing

Despite the loss of about 100 technical men, engineers and related craftsmen, construction plans produced by the Ohio Department of highways including lettings scheduled for May 20 have exceeded the two previous years.

In 1939 the total for the same period was $2,158,809.85 and in 1940 the amount reached $6,588,022.59 whereas this year a total of $7,048,114.41 worth of construction work has been placed under contract or is scheduled to be let.

The grand total for 1941 represents about 35 per cent of the normal program.

This year construction work imposed on the state highway department in the opinion of H. G. Sours, director, may exceed last year's total which reached an all time high, because of military and defense development.

Director Sours issues a caution, though, in stating that congress has not appropriated any funds whatsoever to date for the strategic military highway system nor access roads. The director has pointed out also that no bill has even been introduced in congress for special funds but such an enactment is expected sometime.

If congress does act it is expected that ordnance and defense projects at Sandusky, Port Clinton, Canton, Ravenna, Lockland, Dayton and Columbus will consume most of the funds and these projects probably will be classified as access roads and will not necessarily mean improvements on the main trunk lines depending in each case on the development itself.

Little likelihood of the total military highway funds necessary becoming available is expected as a survey has

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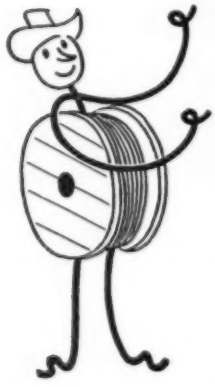

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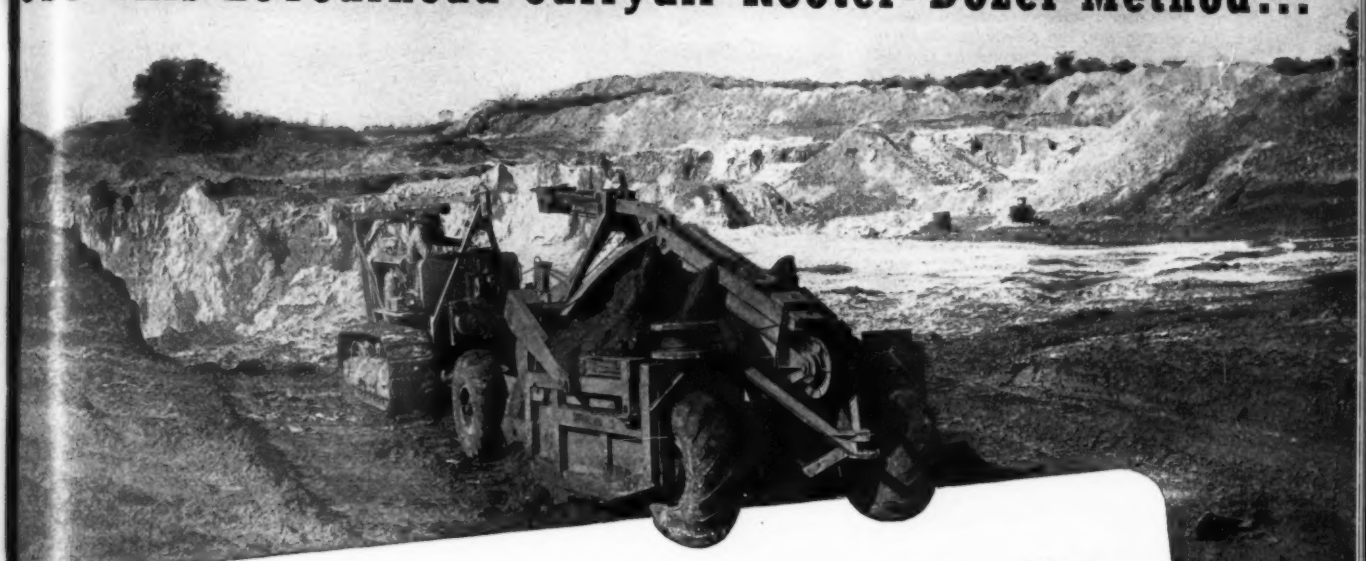
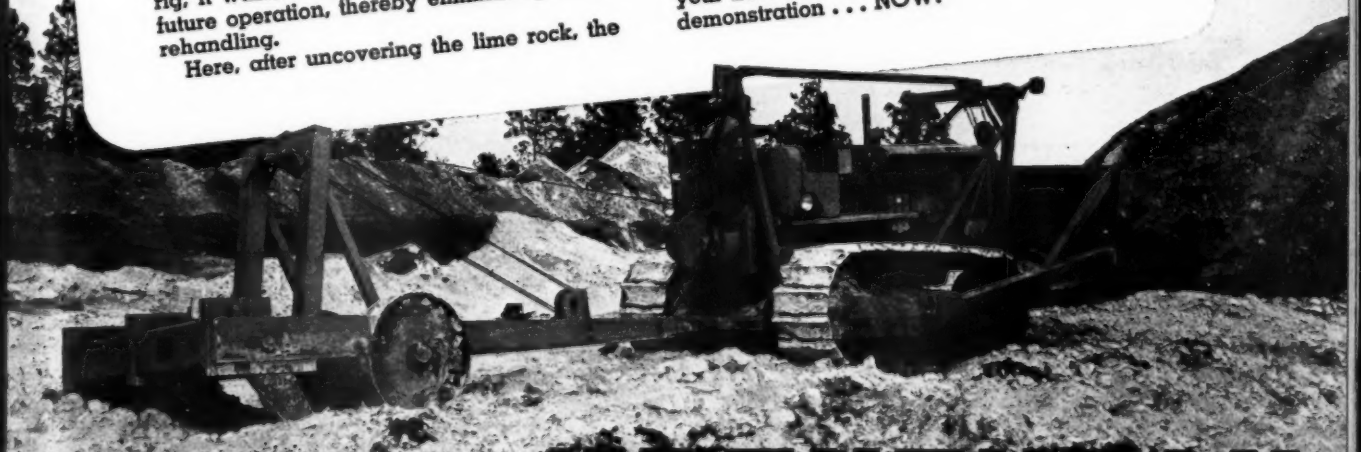


Step up stripping production the low-cost way so many other successful operators are doing . . . by using LeTourneau equipment for stripping and handling materials.

TAKE the Dixie Lime Rock Company, of Ocala, Florida, for instance: By using a LeTourneau LS (11 heaped yards) Carryall Scraper to strip overburden from their Hendricks quarry, they've combined loading, hauling and dumping into one continuous cycle of low-cost operation. In work like this, the Carryall strips capacity loads just as efficiently along the last few inches of overburden as it does on a 30-foot layer. And because the Carryall is a long-haul rig, it wastes overburden beyond range of future operation, thereby eliminating costly rehandling.

Here, after uncovering the lime rock, the Carryall is dropped and a LeTourneau Bulldozer and Heavy-Duty Rooter connected to the same "Caterpillar" tractor and LeTourneau Two-Drum Power Control Unit, to save blasting by Rooting the lime rock. The Bulldozer windrows the broken limestone for quick shovel pickup.

In your case this same time and money-saving LeTourneau stripping equipment can also build your truck roads, shove materials to hoppers, haul and stockpile materials and handle dozens of odd jobs. Try it right on your own property by calling your LeTourneau-"Caterpillar" dealer for a demonstration . . . NOW!



CARRYALL*, SCRAPERS, ANGLEDOZERS*, BULLDOZERS, ROOTERS*, POWER CONTROL UNITS, CRANES, PUSH-DOZERS, SHEEP'S FOOT ROLLERS, TOURNATRAILERS*, TOURNAPULLS*, TOURNACRANE.* *Name Reg. U.S. Pat. Off.

LETOURNEAU

PEORIA, ILLINOIS · STOCKTON, CALIFORNIA

revealed the fact it would require about $43,000,000 to bring Ohio to minimum military standards much of which would be the widening of shoulder berms to a 10 foot standard.

The state highway department is projecting construction projects this year with an eye to a combination of military and civilian needs so as to be prepared as far as possible in the absence of federal action.

Mobile Real Estate

By Floyd Suter Bixby

When you visualize the typical real estate operator, somehow you think of a dapper gentleman in a sailor straw selling a house and lot to some newly married couple. Not all of them are like that. Out at Wilmington, California, the Denni Investment Corporation is selling a good part of their real estate f.o.b. truck to help with the defense work on Terminal Island. They're doing the work in typical construction fashion.

When the California Shipbuilding Corporation of Los Angeles began to expand their shipyard on Terminal Island near San Pedro it was necessary to bring in extra dirt to raise several low spots. The Denni Corporation landed the order for some 90,000 cubic yards of dirt.

Anticipating more work of this nature, Denni ordered a new Bucyrus-Erie 20-B shovel, and moved it in to a hillside on some of his property near Wilmington. The earth lying over this hillside was from 15 to 20 feet deep. Denni figured on completing two jobs in this contract; that of furnishing dirt to the California Shipbuilding Corporation, and also to level the hillside for building when Wilmington expands.

• Fill for the expansion of a shipyard on California's Terminal Island is loaded to a 5-yard Chevrolet truck by the Denni Investment Corporation's ¾-yard Bucyrus-Erie shovel.

The ¾-yard Bucyrus-Erie, powered by a Caterpillar diesel motor, started right off by loading out 1,000 cubic yards of damp silty material the first day. Denni augmented his fleet of GMC and Chevrolet trucks the next day to bring it up to 20 five yard trucks. The 20-B shovel is keeping these trucks constantly busy hauling earth the 8 miles to Terminal Island. A few days after work began, operations were stepped up to 1,200 cubic yards hauled per day, and this schedule is being maintained to insure the early completion of the fill. New buildings to be constructed are awaiting this completion.

According to operator D. D. Page, the 20-B is operating the 8 hours for less than 25 gallons of fuel. The resulting low operating cost is amazing to these men familiar only with the older gasoline powered machines. Denni's 20-B is so new that No. 20 oil is still being used for motor lubrication, and thus far no oil is added between routine changes.

Especially pleasing to Operator Page is the digging range of the 20-B. The excavated material comes from a bank 16 feet deep, that refuses to cave. Everything must be dug. It is not uncommon to see dipper teeth marks up near the top of the cut. The 20-B, carrying an 18-foot boom and a 14½-foot dipper stick, can dig this cut quite nicely and come out each trip with a full dipper. Trucks are spotted by the oiler on the machine so that a boom swing of not more than 45 degrees is necessary between digging and dumping. Weighing about 18 tons, this machine does not require crawler mats in the Wilmington material.

(Continued on page 362)

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Long sharp teeth, with cutting edge on lip between, give easy penetration. Inserted forged tool-steel teeth are reversible and can be removed quickly for resharpening by forging or welding, no bolts required.

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Long front, short back and curved door mean easy filling of corners and back. You get more pay dirt per pass with a Bucyrus-Erie.

Convenient 3-point braces provide adjustable pitch, so handy the operator always works with the best digging angle.

Smooth, inside, flared out toward the bottom means quick clean dumping. Curved dipper-door swings well back giving unobstructed opening and extra dumping clearance. Also permits digging close to cats. Door weight is balanced to give quick opening.

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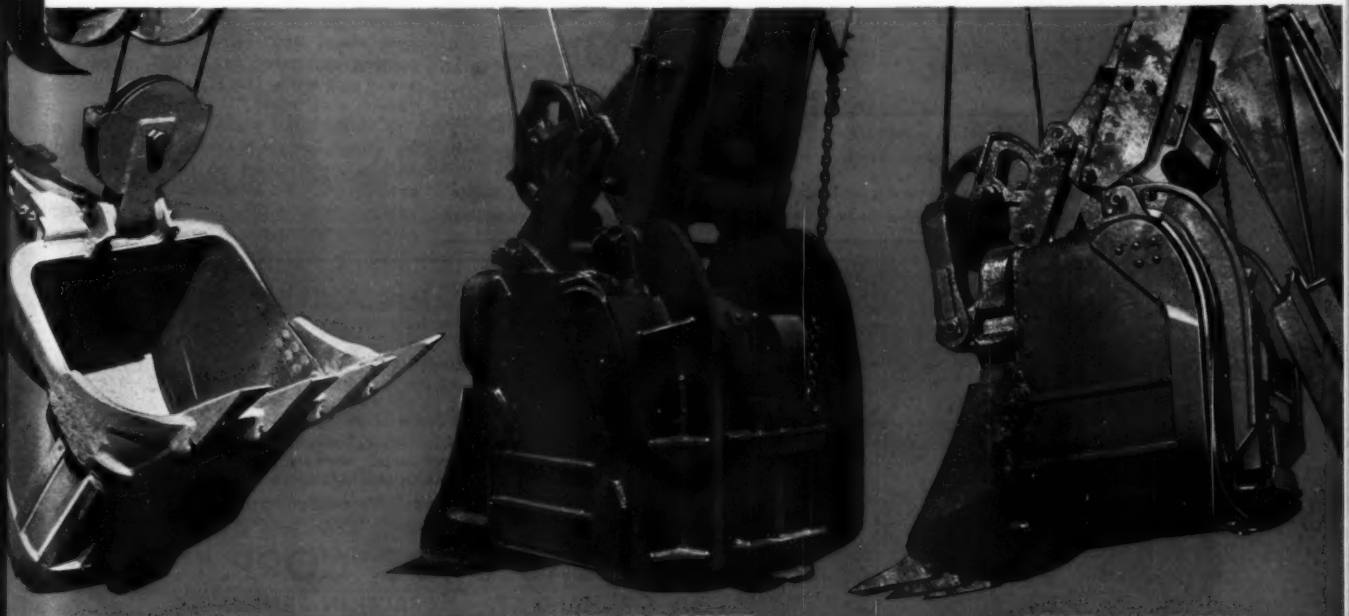
An improved latch of tough specially tempered tool steel sliding in wide bearings gives smooth consistent and secure operation. The latch keeper has a renewable hardened tool steel insert to take the wear and assure a close fitting, easily held latch. Adjustments are easily made and positive locking holds them in position.

Special alloy steel, and use of combination cast and welded construction gives steady performance strength with high speed lightness.



½-YARD 15-B DIPPER 1¼-YARD 33-B DIPPER 2-YARD 44-B DIPPER

B59

Bucyrus-Erie Company

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Shots . . .

(Continued from page 358)

Trucks are dumped in the shipyard and the earth leveled off by a Caterpillar mounted LeTourneau bulldozer. A smaller edition of this machine, a D4, is also used at the shovel. This little machine keeps haul roads smoothed up from the shovel to the main highway, and once in a while pulls a stuck truck out of a mudhole.

The Denni Corporation, in running this work out ahead of schedule, is demonstrating that it, like hundreds of other contractors, is an important cog in the defense machine that is beginning to roll full speed ahead.

IRBA Stresses Road Needs

Importance of highway construction and modernization to national defense was stressed at the spring meeting of the Illinois Road Builders Association held Tuesday evening, May 6, at the Drake Hotel, Chicago.

The road builders were told that there is no time for a road building holiday during the present emergency if highways are to be put in shape to handle the huge transportation volume resulting from the rearmament program. It was indicated that highways vital to defense needs will get priority nationally and in Illinois during 1941, and that there is a good chance for a start on the Chicago superhighway program.

In a two way telephone conversation with Washington, in speeches and in prepared papers, the road builders were given a review of both the state and national highway situation.

Reporting on Illinois highway prospects, Robert Kingery, manager of the Chicago Regional Planning Association, advanced six specific recommendations for Illinois roads, as follows:

1. License fees and gas taxes should remain the same.
2. Division of gas tax revenue be continued at the present rate of one cent each to city, county and state, with state supervision over all.
3. No additional diversion of gas tax funds from road building.
4. Development by the state of a four-year road building program, with counties and cities following suit.
5. State authorization for cities and counties to build highways to be financed by bonds which would be retired by collecting a toll for use of the road.
6. Formation of a "future road" program commission.

Kingery said extensive modernization work is needed on all but one of the nine major routes in Illinois designated for defense priority, most of them being seriously obsolete by present day standards. The only highway in suitable condition at the present time is Route 41 between Chicago and Wisconsin, he said.

"Our highway construction program is a major defense matter," he declared. "With rearmament under way, we cannot afford detours, bottlenecks or traffic jams on our main highways. Illinois has been losing ground rapidly in its modernization program, there being now about 950 miles needing modernization compared with 150 miles nine years ago when the Hunter Commission report was made."

Federal road plans were reported on by Congressman Wilburn N. Cartwright (Okla.), chairman of the house roads committee, in a long distance telephone statement amplified so all present heard the congressman's voice. He announced

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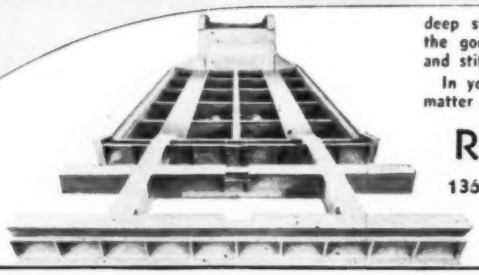

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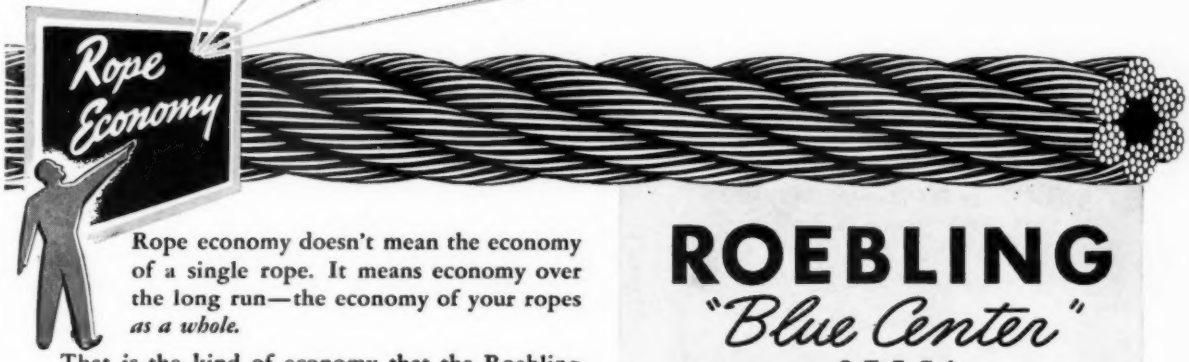

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that $8,398,741 in unobligated federal appropriations for Illinois roads is available as soon as projects are initiated by the state.

Several additional millions will also become available for use on Illinois roads as soon as the government's $287,000,000 defense highway building program is passed by congress, Cartwright said. He predicted that details which have been holding up submission of this program to congress will soon be ironed out and that congress will act on it speedily and favorably as soon as it has the chance.

The congressman informed the road builders that proposed allocations of the $287,000,000 program include $25,000,000 for tactical roads for army and navy maneuvers and $150,000,000 for access roads for defense projects, the full cost of which will be borne by the government. In a third category is $100,000,000 for improvements on the so-called strategic network of main highways, in which federal money will be matched by state appropriations on a basis of 60 per cent federal and 40 per cent state.

The bill also contemplates $12,000,000 for advanced planning for additional work needed on the strategic highways, this cost to be shared equally by state governments in order to give the state an equal voice in determining what work is to be done, Cartwright said.

The road builders heard with approval a statement by the congressman that the contract system of road building will probably be used throughout the defense highway program.

Arizona Stages Water Celebration

With 1,087,780,316,500 gallons of water stored behind Arizona's seven major dams, Uncle Sam's youngest state is feeling optimistic about its future.

Six hundred thousand acres of farmland are largely dependent upon these dams to feed the 4,000 miles of irrigation canals that provide them with life-giving water. Since the amount of water in Arizona's dams is considered an accurate measure of the state's prosperity, not only is its $60,000,000 annual agricultural income assured but business and trade of all kinds will feel an equal benefit.

Over 10,000 residents from all parts of the state participated in a giant water celebration held in Phoenix late in April. Their joyful thanksgiving over the greatest water storage in Arizona's history was expressed in a day-long festival which included a public luncheon on the city's main thoroughfare, speeches presented in front of a giant replica of Roosevelt Dam, street dancing, and a huge evening program climaxed with a pyrotechnic display.

The major Arizona dams—Roosevelt, Coolidge, Horse Mesa, Mormon Flat, Stewart Mountain, Bartlett and Carl Pleasant—are now filled to overflowing for the first time in the state's history.

Award Yakima Ridge Canal Contract

A contract covering the construction of an additional 9-mile section of the Yakima Ridge Canal, which will carry water to irrigate 72,000 acres of dry land in the Roza Division of the Yakima project, Washington, was awarded May 15 to the Barnard-Curtis Company of Minneapolis, Minnesota, on their successful bid of $149,421.50, the lowest of six proposals received and opened by the Bureau of Reclamation.

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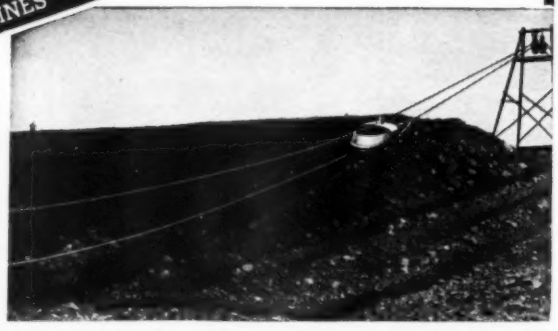

ABOVE—In Finland, this SAUERMAN Slackline Cableway moves clay from a deep pit to car-loading hopper.

RIGHT—A 1½ cu. yd. SAUERMAN Scraper Machine, with head tower mounted on rollers, builds an earth dam 30 ft. high, 5600 ft. long.

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INTERNATIONAL HARVESTER COMPANY
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INTERNATIONAL Industrial Power

Savin Builds A Dam

(Continued from page 333)

struction Company to divide the job into separate classifications of rock and earth. Both were and are handled simultaneously under separate superintendents. In fact, it is as if two entirely separate jobs were being done side by side, the only connection between the two being that the rock excavated from the granite spur is used for the toes and the exterior protection of the upstream and downstream slopes of the completed embankment.

The excavation of the 400-foot-long diversion tunnel, a modified Boston "horseshoe" about 10 feet high by 10 feet wide, was done under a subcontract by Hugh Dolan & Sons, Pottsville, Pennsylvania, as was also the excavation of the gate shaft, a rectangular vertical hole about 50 feet deep. Three Ingersoll - Rand drifters were used in the tunnel, two in the heading, on two columns, and one on the bench. Blast holes were 1⅞". Each advance was about 8 feet. The 4-foot-high bench was kept about 20 to 25 feet back of the heading. The granite was so exceedingly blocky that the subcontractor made an initial "cut" shot in the heading for inspection, prior to shooting the full round. All loading was with American Cyanamid or duPont 60% gelatin. Final complete shooting of bench and heading was done simultaneously, after the inspection "cut" shot in the heading, using as many as 11 electric delays including instantaneous caps in the heading and 3 in the bench. One round per shift was drilled, loaded, shot and mucked, the mucking machine being a Sullivan J-211 double-drum Lohite loader hauler, which was originally purchased for driving coal mine entries. The powder factor was 4 lbs. of explosive per cubic yard of rock, including gate shaft excavation, which was done with equal care, even to the use of inspection "cut" shots.

Surry Mountain Dam's spillway, involving the cutting of a 107,000-cubic-yard notch almost 1,000 feet long through the granite spur, is being excavated by the contractor, A. I. Savin Construction Company. Here the drilling equipment consists of four FM-2 Ingersoll-Rand wagon drills, two S-68 I-R jackhammers, two X-59 I-R jackhammers and two L-9 Sullivan jackhammers. Wagon drills used 2⅛" and 2⅝" Ingersoll-Rand jack bits; jackhammers use 2" and 2⅜" jack bits of the same make.

Spillway Blasting Operations

Blast holes are 16 feet deep except along the steeply sloping sides of the spillway notch. Here the holes are drilled 20 feet deep; the bottoms of the holes are filled with sand stemming; and the lower parts of the holes are then used as guides for the next round of drilling. This produces extremely accurate work on the sloping sides, which rise 1 foot for each 3 inches of horizontal widening on each side.

Blast holes are spaced on 4-foot centers, extending back 30 to 50 feet from the face of the previous blast. All blast holes, except the row down the center, slope approximately parallel to the closest side of the spillway.

About 4 feet of wagon drill hole is made before bits need re-sharpening and the re-sharpening is done with an Ingersoll-Rand J-5 sharpener in the contractor's shop on the job. Bits are usually discarded after three re-sharpenings. Average drilling speed is 150 feet per 8 hours with the wagon drills. No snakeholing or springing is done.

There are six air compressors on the job, all of them Ingersoll-Rand. Three of them are 315 cfm; two are 100 cfm; and one is 500 cfm. This 500 cfm compressor is the one that furnished the air for the tunnel and gate shaft. Working air pressure is 100 lbs.

Blast holes are loaded with 1¼"x8" cartridges of 40% and 60% gelatin, except at the trim holes on the sides of the spillway slopes where only 20% gelatin is used. The 60% gelatin, used in the

• On - the - job supervision is handled by Charles de Biasi (left), superintendent of concrete construction and Temple Rutherford, superintendent of general construction.

• Sand and gravel for the pervious fill area was subbed from Arthur Whitcomb, who used a Bucyrus-Erie 20-B for the loading work.

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Beco Blocks and Linings take the heavy loads at the increased speeds demanded of modern excavating equipment. These Beco products are durable and tough — that's why replacements and adjustments are less frequent.

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Bulldog wedge rope sockets never fail. The harder the pull . . . the tighter the grip! Attachment is easy and quick and directly in line with pull, eliminating costly kinks. Made in a dozen sizes and four different styles. Write for bulletin.

Wire Rope

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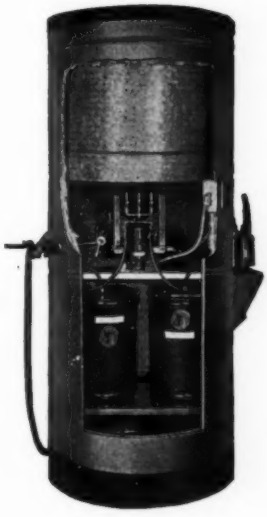
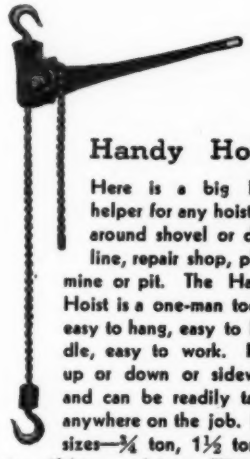
With the NEW Bucyrus Oil Reclaimer, used oil is reclaimed by a simple washing and filtering process at an average cost of about nine cents per gallon. It is a scientific fact, arrived at by leading research engineers and chemists throughout the country, that engine-use breaks down only the weaker and unstable molecules of your oil. These constitute about 10 per cent of the oil—the other 90 per cent, the strongest particles of the original oil, can be separated and cleaned for re-use by the NEW Bucyrus Oil Reclaimer.

Investigate the possibilities of the Bucyrus Oil Reclaimer before you discard another quart of used oil





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BUCYRUS-ERIE

EXCAVATING, DRILLING, AND MATERIAL-HANDLING EQUIPMENT . . . SOUTH MILWAUKEE, WISCONSIN

For your convenience in writing to Bucyrus-Erie Co., you will find a card bound in this issue.

• Surry Mountain Dam specifications call for riprap in large chunks, here a Bucyrus-Erie 1½-yard shovel juggles a big one to the waiting Koehring dumptor.

bottoms of the holes, is not separated from the 40% by stemming, except where there is a crevice to be shut off. Loading is based on an average powder factor of .8 lbs. of explosive per yard of rock, but varies from .66 to 1.25. American Cyanamid and du Pont explosives are used.

Extreme care is used in the blasting because of the blocky nature of the granite and the need of avoiding any cracking of the diversion tunnel and gate shaft, which are already lined with concrete, and which are beside and below the spillway. Hence as many as 4 electric delays, including instantaneous caps, are used occasionally, but the normal procedure is to shoot the center row of holes, together with two to four adjacent rows of holes first. For this purpose, instantaneous caps are used in the center row and the nearest row on each side, with first and sometimes second electric delays in succeeding rows. After the center is shot out, the sides are blasted, using instantaneous, and first electric delays and occasionally second delays in wide sections.

From 50 to 150 holes are shot at one time, using a du Pont 100-hole blasting battery. Extreme shattering of rock is being avoided because of the later use of the blasted material as rock fill and riprap, but chunks that are too large, even for this purpose, are drilled with air hammers and pot-shot.

Loading Out the Rock

The shattered rock is loaded out with a 1½-yard 37-B Bucyrus-Erie shovel, powered with a Caterpillar diesel motor. Since at least ⅓ of the rock, well distributed, must be the entire thickness of the riprap, and at least 50% of the 3-foot rock fill on the embankment slopes must be ½ cu. yd. or larger, up to 1 cu. yd. maximum, the shovel operator is an expert at juggling big hunks on the dipper teeth. Although the digging is by no means easy, this 37-B loads out an average of 800 cubic yards of rock per shift, at least half of it riding on top of the dipper and never passing through.

Excavated rock is hauled away to the embankment for use as rock fill, or to tunnel approach conduit intake and outlet works and spillway approach, by various types of equipment, which is also used for any other needed work. This equipment includes three Linn DUR-437 gas-powered 8-yard crawler dump trucks, four Model W-55 gas-powered Koehring Dumptors and one Athey crawler dump truck of 15 yards capacity, usually towed by an Allis-Chalmers HD-14 General Motors diesel-powered tractor. Front tires on the Linns are 9.75″ x 20″; front tires on the Koehring Dumptors are 13.50″ x 24″ and rear (steering) tires are 9.75″ x 20″. Most of the tires are the product of the General Tire and Rubber Company.

When the job was visited for the purpose of gathering material for this article, a 37-B Bucyrus-Erie Caterpillar-diesel-powered crane with a 60-foot boom was placing "derrick stone" riprap on the banks of the channel outlet south of the spillway. The 37-B was picking 'em up and laying 'em down neatly, using a chain sling and a couple of hooks, while its 1½-yard clamshell bucket took a brief vacation.

To the north of the 37-B Bucyrus-Erie crane, where the spillway joins the channel outlet, an L-80 Thew-Lorain crane with a 60-foot boom and a 1¾-yard clamshell bucket was finishing a cleaning-up job which the Bucyrus-Erie crane had been doing just before it was put to work laying riprap. Ordinarily this Thew-Lorain is used as a 1¾-yard shovel in the "A" borrow pit.

Out on the embankment a 303 Koehring crane, gas-powered with a Waukesha motor and swinging a ¾-yard clamshell bucket from the end of its 45-foot boom, was placing a three-foot layer of the excavated rock on the embankment slope.

Aside from the 37-B Bucyrus-Erie shovel, which is the only digging equipment used in the hard going of the rock cut, the shovels and cranes on this job are changed about as the work requires. The 37-B Bucyrus-Erie crane just mentioned as placing riprap was also used for a time as a dragline; the Thew-Lorain shovels are

• Earth and clay are stripped by a 1¾-yard Lorain shovel loading to a 28-yard LeTourneau wagon hooked to an Allis-Chalmers tractor.

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Keep your investment down by having a Koehring on your job . . . quickly convertible for all work . . . one machine for all jobs. Use it for excavating of all types . . . shovel, clamshell, or dragline . . . handling material, steel, piling, concrete buckets, forms. Easy steering and moving in tight spots, accurate boom control, stable operation, and quick moves on or between work locations are Koehring advantages for speeding up the work and increasing profit. Increase your profit with an All Purpose Koehring.

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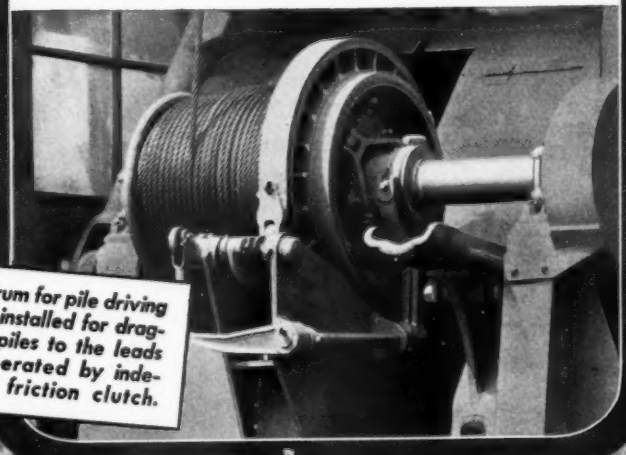

Third drum for pile driving can be installed for dragging in piles to the leads . . . operated by independent friction clutch.

KOEHRING HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

For your convenience in writing to Koehring Co., you will find a card bound in this issue.

• A layer of pervious fill is spread on the dam embankment by a Caterpillar-powered 12-yard LeTourneau scraper.

occasionally rigged as cranes; in fact, there's always something new going on. Even the 37-B shovel gets shifted from digging rock to a soft job loading out earth when blasting is delayed for a few hours.

Placing Embankment Fill

Now let's take a look at the embankment. First contractor had to clear about 20 acres and grub 10 of these acres. Then he had to strip off 46,000 cubic yards of earth and boulders from the site of the embankment. This stripping wasn't enough to provide a suitable foundation, so he took off an additional 8 feet to get down below the logs and other river deposits. The original stripping was done with a 12-yard and an 18-yard LeTourneau scraper, both pulled by D-8 Caterpillar diesel-powered tractors. The additional 8 feet was dug out with the two 37-B Bucyrus-Eries previously mentioned, one was the 1½-yard shovel now used in the rock cut; the other was the crane, operating as a 1½-yard dragline. Top soil was stored for future use in landscaping. Earth and boulders were dumped over a spoil area.

Next came the excavation of an impervious cut-off trench extending from the granite spur on the west, all the way across the valley and up the other side to the extreme eastern end of the crest of the dam. This job was also done with the 37-B Bucyrus-Erie shovel, as were the equally long trenches for the upstream and downstream rock toes of the embankment.

Five borrow areas are provided by the U. S. Engineers, two of them containing excellent impervious material, another containing impervious material for limited use, and the remaining two containing sand and gravel deposits for pervious fill. The completed embankment will rest on a core of impervious material with a blanket of random impervious material on either side topped by another layer of pervious material. Upstream and downstream slopes of the embankment are being covered with a 3-foot layer of rock.

Impervious and random impervious material are excavated by two L-80 1¾-yard Thew-Lorain shovels with Waukesha - diesel - powered motors.

Hauling the impervious and random impervious fill from borrow pit to embankment are three 28-yard LeTourneau wagons, one 8-wheeler and two 16-wheelers, pulled by D-8 Caterpillar diesel-powered tractors. The tires on the 8-wheeler are 18″ x 24″ and those on the 16-wheelers are 13.50″ x 20″, all Generals. Also hauling fill are three HC-140 5-yard Sterling gas-powered trucks and four HC-145 5-yard Sterling gas-powered trucks, all using 10.50″ x 24″ General tires. Occasionally the 15-yard Athey crawler dump truck comes over from the rock cut and lends a hand hauling borrow. At other times the Allis-Chalmers HD-14 tractor is unhitched from the Athey and used to pull one of the LeTourneau wagons at the borrow.

Sand and Gravel Subcontracted

The sand and gravel pervious fill is dug from a rather distant borrow pit (Borrow Area "D") with a 20-B Bucyrus-Erie shovel and a Mead-Morrison shovel by Arthur Whitcomb, of Keene, New Hampshire, who has a subcontract for the excavation and delivery of this material as well as the concrete aggregate. Still other pervious fill is hauled a maximum of 3,000 feet from bins, filled by Whitcomb's trucks, in a 12-yard LeTourneau scraper, which loads under the chutes and is towed by a D-6 Caterpillar diesel-powered tractor.

Impervious, random impervious and pervious fills are leveled with two LeTourneau bulldozers operated by D-8 Caterpillar tractors, assisted occasionally by a Baker bulldozer riding on an Allis-Chalmers HD-10 diesel-powered tractor. Compacting of impervious and random impervious fill is done with two LeTourneau sheepsfoot rollers which are towed behind one of the LeTourneau bulldozer-tractor combinations.

A model W Allis-Chalmers Speed Patrol gas-powered grader is kept busy doing numerous bits of construction road grading. Other automotive equipment includes two rented 1½-yard Ford aggregate batch trucks, Whitcomb's fleet of trucks for hauling pervious fill, and three Ford pick-up trucks owned by Savin.

Concreting of spillway, spillway weir, inlet and outlet channel, retaining walls, etc., is probably now under way. One set of Blaw-Knox and one set of Johnson 3-compartment bins, complete with Howe and Johnson scales, have been erected. The rented 1½-yard Ford batch trucks will haul from the bins to the 27-E 1-yard Foote and Rex mixers and the concrete is handled from there with a Model 160 Pumpcrete equipped with a 6″ delivery line.

Two Chicago Pneumatic air pumps are used for dewatering the tunnel. A Rex road pump is used for wetting down the material on the embankment. A Domestic road pump supplies the concrete mixers with water, while a Sterling and a Rex, 6″ centrifugals, are used for dewatering excavations.

Equipment is maintained by a master mechanic who has two men in his crew, while the contractor also has a tractor repair man visit the job every Sunday. A well-equipped repair shop on the job is kept busy, although most

of its work is done to anticipate and prevent breakdowns.

All diesel equipment is serviced direct by a Gulf tank truck. Gasoline (also Gulf) is served to the various machines in drums carried by any Savin truck that is not otherwise busy. Texaco grease and Kendall lubricating oils are used.

The contract specifies that no work shall be done on Sundays or holidays, except in cases of emergency. The regular daily shift is 8 hours and two shifts are worked daily during June, July, August and September. Minimum wage rates are set by the United States Department of Labor, but most of the men are paid more than the minimum wage.

Col. J. S. Bragdon, is district engineer of the U. S. Engineer Office, Providence, Rhode Island, with Capt. A. G. Viney as his military executive assistant. Carl H. Lovejoy is area engineer of the Hartford Area, with Arnold McSpadden as resident engineer.

Temple Rutherford is superintendent of general construction for A. I. Savin Construction Company. Other Savin "keymen" on the job are: Charles De Biasi, superintendent of concrete construction; Manuel Nunes, foreman of the spillway rock cut; Ernest Willett, blasting foreman; Frank Medbery and Alfred Holsman, carpenter foremen; Lewis O'Marr, concrete foreman; Maurice Kane, embankment foreman; Stephen Curtis, master mechanic; and John Gillis, office manager.

Safety First!

(*Continued from page 339*)

other words, poor supervision. Some simple but important rules that should govern the transportation of workmen in motor trucks are as follows:

1. Motor trucks preferably should be provided with seats for all riders; otherwise, with strong rails or bars which the men may hold on to while standing.

2. Trucks should never be overcrowded.

3. The speed of the trucks should be limited to 30 miles per hour.

4. Only men hired for the purpose should be allowed to drive.

5. The working hours of drivers should be restricted so as to eliminate the probability of undue fatigue.

6. Definite instructions should be issued and enforced, to assure compliance with the foregoing measures.

Accidents, often resulting in personal injuries and death, occur when machines are improperly operated or are not adequately safeguarded, or when they get out of control because some essential part fails. With few exceptions these unfortunate occurences might be prevented by properly training and supervising the operators of the machines and all other members of the working force, and by keeping the equipment in good repair and providing all necessary safety fittings and appliances.

Australia's new Transcontinental highway, connecting Darwin with Adelaide, is nearing completion and is expected to be open for traffic some time this year.

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TVA *Job Management Methods*

(*Continued from page 337*)

where several like units are used on the same job, an average hourly charge per unit may be made to cover all expenses.

Operating labor is charged direct to the machine when on an hourly charge-out basis. The effects of operator delays due to particular work is pointed out to the foreman as being his chief controllable item of day-to-day equipment expense. Fuel charges are kept from warehouse gasoline or oil issues, or power prorations. Spot checks of fuel consumption often provide the proper percentage of entire system output. Such a check of air equipment is shown in the table below.

Recording meters placed on the power lines serving two stationary compressors were observed to fluctuate differently than other construction power loads, also metered. The startling results brought out in such charts was that the compressor load dropped off for more than a usual time during shift changes at 6 a.m., 12 noon, 6 p.m., and 12 midnight. Except for the 6 a.m. change, it apparently took the air crews about an hour to get up full air consumption, inferring a similar lack of production. This was discussed in a foremen's meeting, and further study and improvements were made. Getting back to our cost discussion, "Expense" charges to machine operations are watched for exclusion of distinct costs that apply only to the work being done and which are not a factor of equipment operation. Where expense due to accidents, operating inspection, idle repair-crew time, job overhead, ramps, cribs, moving, and erection are included, they are considered in the machine charges to the work in hand.

Cost analyses show period and to-date expense in total dollars and per operating hour. On special operations, units of costs, production, or time are shown in representative relation to the work done. Labor may be in man-hours, material in units by which usually purchased, and expense on a job factor basis. Such a cost breakdown for core drilling operations showed overburden and drilling in linear feet; casing in feet of pipe, shot in tons, or diamond loss in carats; fuel in gallons, repairs and depreciation per net operating hour; total in linear feet drilled. Preliminary figures were given from field records only, and indicated the trend of expense for a special and difficult job. Where operations are of a simpler character or of remote control, a special operating report may be used for control and summary purposes. The standard time distribution is given at the top; labor hours, rates and extensions are shown; fuel consumption for the day or shift is extended, the use rate is added, and the total shift cost obtained. Repair labor and material is noted on one section of page and remarks complete the

• Spotted by an overhead cableway, a TVA 'dozer goes to work despite high flood waters.

CONSTRUCTION PLANT BULLETIN

October 4, 1935 — No. 4

Subject — Air Consumption Pneumatic Equipment

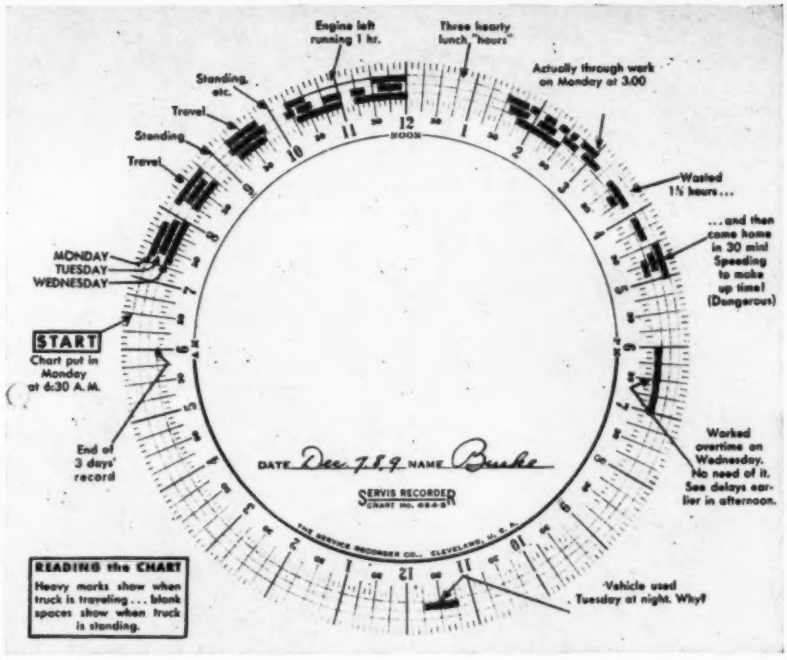
Item	Type and Make	Pressure lbs. per Sq. In.	Air Consumption Cu. Ft. Min.	Source of Data
Blowing Cone	Cement Silo	80	186.2	NOD Test
Blow Guns	¾" Blast Hole Blow Gun	80	147	NOD Test
Busters	K7—Sullivan	80	51	Mfg Spec
	K6—Sullivan	80	60	Mfg Spec
Cement Pumps	Type H Fuller Kinyon 220 BBl/hr (Designed for 250 c.f.m. at 40 lb.)	80	160	NOD Test
Drill Sharpeners	Class A—Sullivan	80	97	Mfg Spec
	Mod. 50—I.R.	80	161	NOD Test
Grout Pumps	7"x5"x10" G. D.	80	220	NOD Test
Hoists	LH 3A G. D.	80	139.5	NOD Test
	DU UTILITY I. R.	80	139.5	NOD Test
	No. A7 1 Drum Turbinair Sullivan	80	184.5	NOD Test
	H. U. Hoist I. R.	90	210	Mfg Spec
Jackhammers	S49 I. R.	80	90.9	NOD Test
Oil Furnace	No. 26 I. R.	80	75	NOD Test
Paving Breakers	B72—G. D.	80	48	Mfg Spec
	CC45—I. R.	90	61	Mfg Spec
Shank Grinders	No. 4K I. R.	80	47.5	NOD Test
Small Tools	I. R. 90 Corner Motor on Grout Mixer	80	75	NOD Test
	S55 G. D. Air Drill	80	93	Mfg Spec
	Chipping Hammer I. R.	90	25	Mfg Spec
	Chipping Hammer Thor	90	19	Mfg Spec
	Chipping Hammer No. 3 Boyer	90	25	Mfg Spec
	Chipping Hammer No. 1 Boyer	90	25	Mfg Spec
	Riveting Hammers No. 80 Boyer	90	42	Mfg Spec
	Riveting Hammers No. 90 Boyer	90	42	Mfg Spec
Wagon Drills	Type D X71 Drifters I. R.	80	230.6	NOD Test
	Type WD33—Worthington	80	230.6	NOD Test
	Type WD2—G. D.	80	230.6	NOD Test
Water Pumps	Type 361T Rotary Thor 2½"	90	72	Mfg Spec
	Size 25 I. R. Sump Pump	80	101.5	NOD Test

8½x11" sheet. Continuous summaries of any one piece of equipment may be made for job or central control, by combining the monthly time and expense summary headings on one 11"x17" sheet for each machine, and carrying forward period and to date entries.

Special Operation Studies

Particular studies, as on Figure 7, are sometimes made by means of a "Servis Recorder," which gives positive hourly checks that may be summarized by a quick reading totalizer. Quick field checks are often possible by an experienced field observer. His standard form of presentation describes the major job conditions and recorded cycles. The effect of operator factors, shift realignment, weather, grades, and auxiliaries are often noted. New equipment tests are carefully watched to present similar conditions and comparable representation of the various manufacturers. On such competitive observations operators are rotated, shifts changed, and the same material tried on all makes. Like maintenance facilities are kept in force, and attention to design weaknesses may be taken up with the manufacturer's representative. Fuel checks, speed studies, capacities, variances in feed or disposal, and a review of safety, accessibility, and general handling are given the proper weight. Another form of gathering equipment operating information used a direct questionnaire to operators and mechanical forces. Many design and operating characteristics were brought to light and incorporated in permanent practices.

At the close of a major job or during slack periods, questions arise as to the proper disposition of idle equipment. The economies of disposal are reflected in the final job costs and in the overall balance of the organization as a whole. Equipment may be sold, transferred, stored, rebuilt, or retired completely. A review of future schedules is made, bearing in mind other like items owned, together with their age, location, and condition. The equipment register lists are consulted and the requisition files are perused for complete, up-to-date description of the machine history. Rented items are sometimes returned and idle owned equipment substituted where applicable. At times the rentals paid accrue toward purchase of the equipment, but the trend of equipment repairs, the service conditions, and adaptability of the machine may indicate that no equity exists and the machine is returned.


Engine left running 1 hr.
Three hearty lunch "hours"
Actually through work on Monday at 3:00
Standing etc.
Travel
Standing
Travel
Wasted 1½ hours...
...and then came home in 30 min! Speeding to make up time! (Dangerous)
MONDAY
TUESDAY
WEDNESDAY
START
Chart put in Monday at 6:30 A.M.
End of 3 days' record
DATE Dec. 7 19 4 NAME Burke
SERVIS RECORDER
Worked overtime on Wednesday. No need of it. See delays earlier in afternoon.
READING the CHART
Heavy marks show when truck is traveling... blank spaces show when truck is standing.
Vehicle used Tuesday at night. Why?

• **FIGURE VII — Positive hourly checks on truck equipment are made possible by this Servis Recorder which records the complete story of actual operation.**

Condition reports are used in various degrees of refinement. From the general statement of availability, which lists all items to be handled in this category, further details are developed as needed. Expense accruing from idle repair crews temporarily out of work, or from standby operators doing a bit of inspection and tuning up, may add up to expensive "conditioning." A typical condition study is prepared where necessary. The major assembly parts are listed for notation from visual or measured inspection, and an estimate of repair for each part group is given. For a materials bucket the breakdown would be: bails, sheaves, sheave housings, lips and teeth, side plates. The total repairs for any estimated service is noted and remarks show field opinions and suggestions. The present status of the machine as to service, storage, protection, locations, etc., is included in the report. The "value" of the machine to the whole future program is analyzed in the central office. The investment-repair curve is again referred to and actually is the watchdog of the disposal situation.

Investment study chart 9032-149 (Figure 8) shows a determination of disposal economies. During its life, equipment may be sold at varying prices. The possible offered amounts upon sale or trade-in may be deducted from the total expense accumulated to date and a new rate line be drawn from the curve zero to indicate the final expected ownership rate. If this rate is below the latest revised standard to be expected for such a machine, it appears that an economical disposition could be made, all other use and service requirements being favorable. In the figure shown, the future repairs are plotted in dotted lines, as taken from the condition report information. This curve indicated that the machine could not be used any further without exceeding the minimum cost to own and condition. However, the machine was at a critical stage near the 7,000 hour life, and care was exercised to see that the ownership rate did

not develop a rapid upward sweep. An increased repair rate is permitted provided it does not exceed the standard ownership rate or indicate unreasonable mechanical delays. Supposedly an old machine could not be replaced by a new one at any better net result than the standard rate developed by the investment control set up by the central records.

In many cases superintendents ask for a review of their entire fleet, based on their immediate future program. It has been determined that factory rebuilds are sometimes possible for known service conditions. In such an event, a new job is supplied with suitable equipment with a minimum investment, and the manufacturer is fully cooperative in having the opportunity to prove that low cost hauling rates are possible with his units. Under certain other conditions the cost of storage, movement, and idle deterioration are considered with the current market or outside inquiries. All have a bearing on the proper disposal procedure.

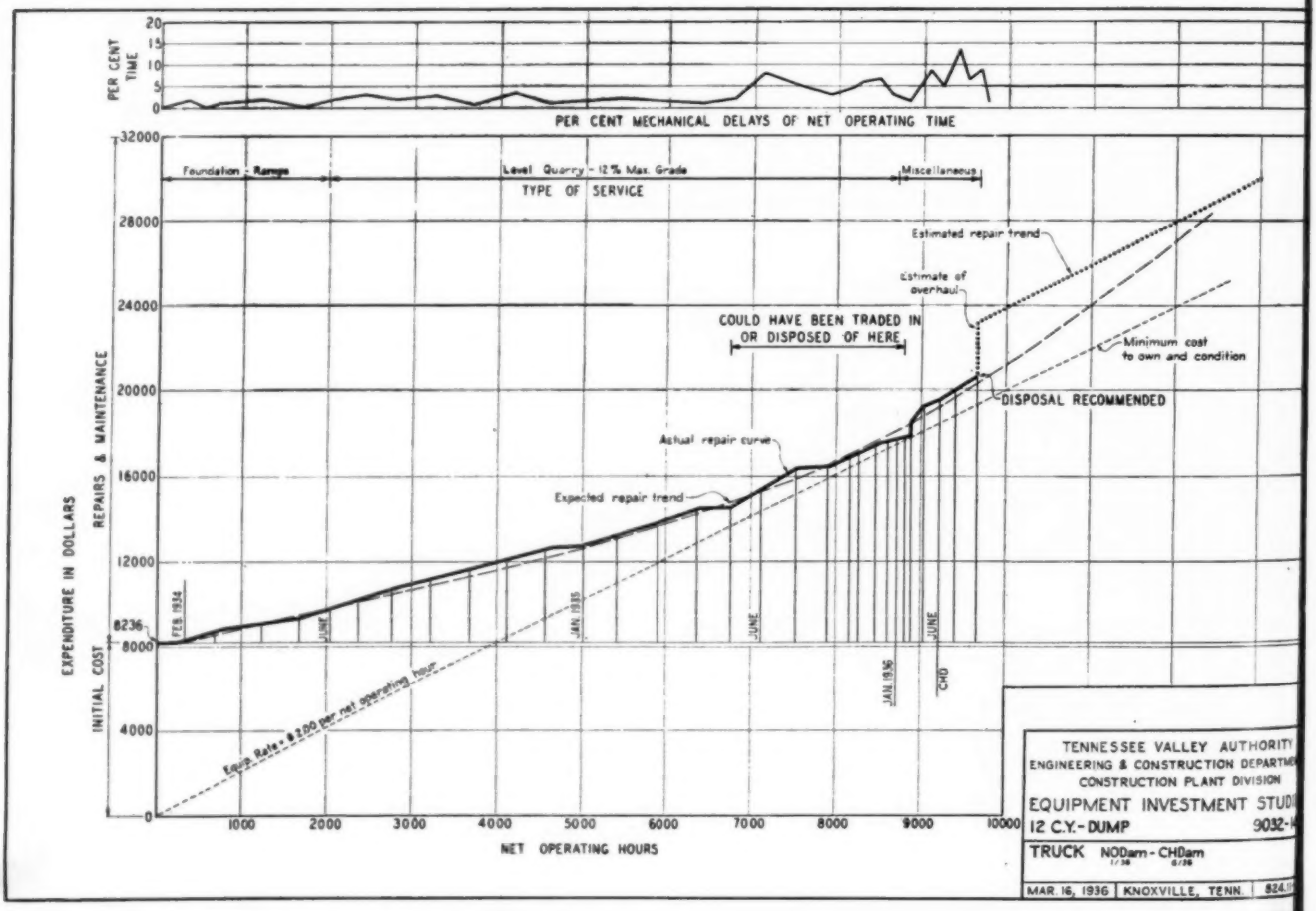
The dismantling and storage arrangements follow such central decisions. The condition study is completed to show the storage area, protection, marking, and record references. Small equipment, more mobile and easily maneuvered, is retained for dismantling the heavier units and assemblies. Inventories, shipping lists, loading facilities, and routing instructions are prepared for most expeditious and coordinated handling. Where possible, shipments to other jobs are made in blanket loads, by carload, barge, or truck fleet. Spare and dismantled working parts not currently usable on active jobs are taken care of by boxing, crating, and storage.

The plant operations problems are thus under control for future activities. A good knowledge of the equipment has been used to provide continuous economies. What the equipment is, where it works, what it does, how it works, and its costs are just a practical control of identification, service, production, maintenance, and investment.

• FIGURE VIII — Equipment investment studies mapped out in graph form enable TVA officials to set the proper time for disposal of old machines for new equipment.

Organization and Value

With all the considerations given in foregoing paragraphs, and with all the records, charts, studies, controls, and summaries, one may wonder what kind of an organization is required for such work. Is it dead overhead? Are there just so many monthly men to be carried whether construction work is plentiful or not? How can one measure the degree of effectiveness of such a program of construction plant engineering? The construction plant engineer is faced with just these prime considerations. Practical results are the only ones wanted. How well such results are interpreted and received calls for a careful balance of personalities, proper selection of problems of major importance, and adoption of sound policies of operation practices. The construction plant engineer is the keystone in this field. However, he is the first to realize the dependence of the work upon the contributions by the entire working personnel. In the assignment of particular studies, duties, or responsibilities, opportunity is given for the detail worker to bolster



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his own confidence and the respect of the whole organization by recognition of the results achieved.

The office of the construction plant engineer is the policy making and control point of matters pertaining to his field. The field jobs assist in the planning and coordination of schedules, the receiving and inventorying of equipment, the establishment and maintenance of investment records, and the observation and analysis of production and mechanical features. Summaries, reports, and disposal arrangements are worked out in conformance with general central policies.

The central office forces prepare standard or special designs and specifications, expedite purchase, inspection, or delivery, and provide coordinated planning with all jobs and agencies or departments. Requisition and ownership data files are kept there, along with rate studies, operation costs, performance and repair studies and facilities for exchange of plant data. Transfer clearances are issued in keeping with schedule and availability applications; disposal recommendations are prepared for executive approval. Cooperation is maintained with legal, purchasing, traffic, and financial departments. Field contacts are made regularly, and investigations are made in connection with up-to-date trends of the equipment field on other jobs, exhibits, and tests.

The values of such activities are recognized in the continuous program under way. Economies of investment control are apparent by the complete familiarity with the large capital assets involved. A knowledge of the inventories and values enables the whole organization to function smoothly and efficiently. The planning and acquisition savings are comparable to the fees paid for an architect's services, which would include design, treatment of details, selection of materials, specifications, and supervision of the work. It does not take many applications of transfer savings to justify attention to that phase of plant operations. Considering the opportunity of one tractor transfer ($3,000 saved) or three pumps ($1,500), or trucks, or cranes, drills, or accessories, one can see major turnover possibilities on almost any size plant investment. Output volumes are stepped up, and in some cases better products, such as quarry sand or rock, or rolled fill compaction, are secured by improved equipment operation. The repair and disposal studies allow real economies since repairs on major equipment generally amount to as much as or more than the original cost of the machine. Day-to-day watchfulness and termination of the use of expensive machines show the value of such a procedure. All in all, substantial savings are easily possible from these operations.

The Board of Directors of the Tennessee Valley Authority, of which Dr. Harcourt A. Morgan is chairman, acts through the general manager, Gordon R. Clapp. Col. Theodore B. Parker is chief engineer, and A. L. Pauls and Robert T. Colburn are chief construction engineer and construction plant engineer, respectively.

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OREGON, PORTLAND: Clyde Equipment Co., 17th & Thurman Streets. Phone Broadway 5561.
*PENNSYLVANIA, PHILADELPHIA: Bucyrus-Erie Company, 821 Commercial Trust Bldg. Phone Rittenhouse 4251.
PHILADELPHIA: Furnival-Rimmer Co., Lancaster Ave. at 54th St. Phones: Trinity 5200 and West 1617.
BRADFORD: Beckwith Machy. Co., 261 Congress St.
HARRISBURG: Beckwith Machinery Co., 635 N. Cameron St. Phone 4-4064.
KINGSTON: Beckwith Machinery Co., 249 Market St.
*PITTSBURGH: Bucyrus-Erie Co., 1502 Clark Bldg. Phone Atlantic 4815.
PITTSBURGH: Beckwith Machinery Co., 6550 Hamilton Ave. Phone Montrose 4300.
TENNESSEE, KNOXVILLE: Brooks Equipment & Mfg. Co., 408-10 Davenport Rd.
MEMPHIS: Road Builders Equipment Co., Third and Calhoun Sts.
TEXAS, DALLAS: E. B. Chambers, 1806 Tower Petroleum Bldg. Phone 2-2943.
ABILENE: R. B. George Machinery Co.
DALLAS: R. B. George Machinery Co., 1125 S. Lamar St.
EL PASO: Tri-State Equipment Co., 500 E. Overland Ave.
HOUSTON: Gulf Tractor & Equip. Co., 3100 Polk Ave.
PECOS: Tri-State Equipment Co.
SAN ANTONIO: Wm. K. Holt Machy. Co., West Harding Rd.
TYLER: R. B. George Machinery Co.
UTAH, SALT LAKE CITY: The Lang Co., 267 N. First St.
VERMONT, BARRE: Reynolds & Son, Inc.
VIRGINIA, RICHMOND: Virginia Tractor Co., Inc., 1623 W. Main St.
WASHINGTON, SEATTLE: Clyde Equipment Co., 3410 First Ave., South.
*SEATTLE: Bucyrus-Erie Co., 3408 First Ave., So. Phone Main 6424.
SEATTLE (for Alaska): Northern Commercial Co., 419 Colman Bldg.
SPOKANE: Construction Equipment Co., 1113 Ide Ave.
WEST VIRGINIA, CLARKSBURG: General Equip. Co., Inc., 414 N. Fourth St.
HUNTINGTON: Chas. S. Porter Supply Co., 424 Fourth Ave.
WISCONSIN, MILWAUKEE: W. L. Hartley, 2446 N. 62nd St., Wauwatosa, Wis.

Canada

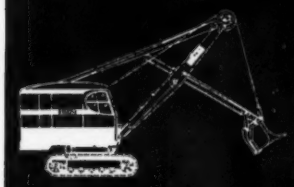
BRITISH COLUMBIA, VANCOUVER: Finning Tractor and Equip. Co.
MANITOBA, WINNIPEG: Kipp-Kelly, Ltd., 68 Higgins Ave.
NEWFOUNDLAND, ST. JOHN'S: Newfoundland Tractor & Equip. Co., Ltd.
ONTARIO, TORONTO: F. H. Hopkins & Co., Ltd., Commerce & Transportation Building.
QUEBEC, MONTREAL: F. H. Hopkins & Co., Ltd., 340 Canada Cement Bldg., Phillips Square. Phone Plateau 1136.

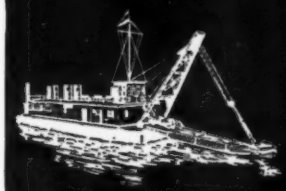
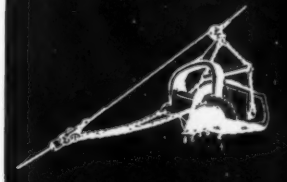
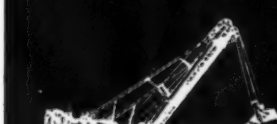
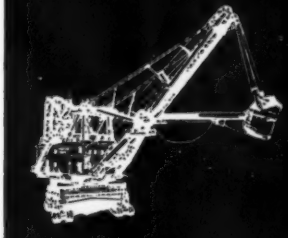
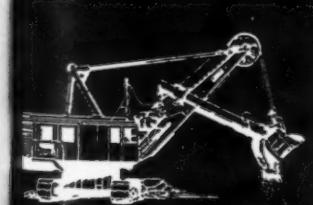
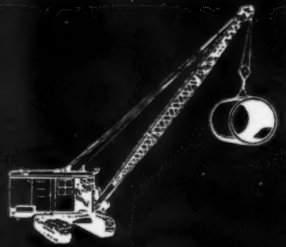
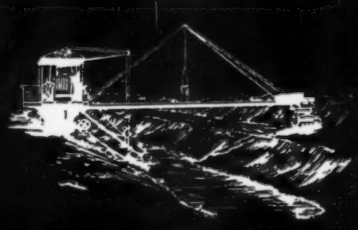
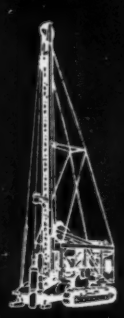
For Bucyrus-Erie Tractor Equipment — Bulldozers, Bullgraders, Hydraulic and Cable-Controlled Scrapers, Rippers, Tamping Rollers and Power Control Units See Your International Industrial Power Dealer

You can choose a modern Bucyrus-Erie and be sure of getting performance exactly suited to your needs. In 60 years Bucyrus-Erie has built over 30,000 machines for the excavating, drilling and material-handling field. With sales and service representation in all principal countries of the world, Bucyrus-Erie has a breadth of experience that is added assurance of the performance you want.

Bucyrus-Erie

GENERAL OFFICES: SOUTH MILWAUKEE WISCONSIN U. S. A.



NOT in the *Contract*

Rastus was urging upon his wife his dying wish. "Mandy, afteh Ah dies Ah wish you'd marry Deacon Shorter."

"Why so, Rastus?" asked Mandy.

"Well, Mandy, I'll tell you de truff. Deacon Shorter trimmed me on a mule trade once."

Under the heading, "Gas Overcomes Girl While Taking Bath," we see by the local paper that:

"Miss Cecelia M. Jones owes her life to the watchfulness of Joel Colley, elevator boy, and Rufus Bacon, janitor."

Wife: "John—I'm sure I heard a mouse squeak."

John: (half asleep) "Well, I suppose I'll have to get up and oil it."

Query: If you put a mamma duck and five little ducks in a box and shake them—what do you have?

Answer: A box of quackers.

"I can't quite diagnose your case. I think it must be drink."

"All right, Doctor, I'll come back when you're sober."

Father: I want you to stop running around with that wild woman.

Son: She isn't wild, dad. Anybody can pet her.

Usher (to cold, dignified woman): "Are you a friend of the bridegroom?"

Woman: "No, I am the bride's mother."

The man at the movie was annoyed by constant talking behind him.

"Excuse me," he said, turning around, "but we can't hear a word here."

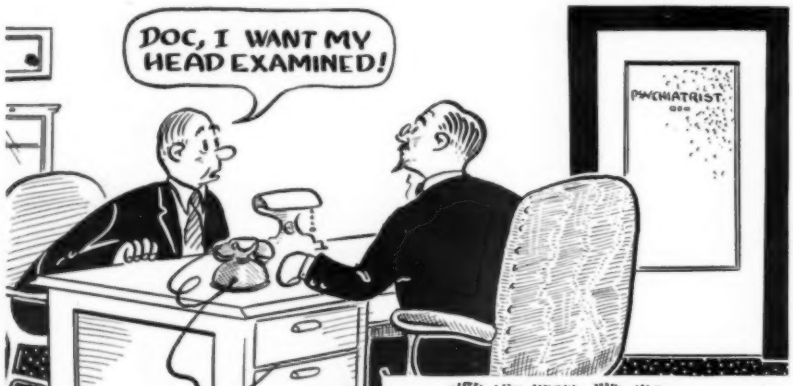
"You don't say so," retorted the woman behind. "Well, what we're talking about isn't any of your business."

Mary had a little lamb
His hair was white as heck
And everywhere that Mary went
The poor sap signed the check.

"I'll never go anywhere again with you as long as I live."

"Why?"

"You asked Mrs. Smith how her husband was standing the heat, and he's been dead two months."



...ugh the heart, just ...

garage door.

LOWEST BID UNSIGNED

Vermillion, Ohio — (U.P.) — Some contractor, anxious to get a contract on a school addition here, figured carefully, submitted the low bid—and then forgot to sign his name or otherwise identify himself.

"He drove straight to his goal," fervently spoke the orator. "He looked neither to the right nor to the left, but pressed forward, moved by a definite purpose. Neither friend nor foe could delay him nor turn him from his course. All who crossed his path did so at their own peril. What would you call such a man?" He paused for effect.

"A truck driver," came a knowing voice from the rear.

"And how is your good wife, Sultan?"

"Oh, she's all right, but the other forty-nine are more fun."

Ikey saw his friend Jakey in the smoking car when he entered and sat down in the same seat.

"How was that fire in your place last week, Jakey?" he inquired.

Jakey started nervously. "Sh!" he whispered, "it was next week."

Women take to good hearted men. Also from.

Pop: "Well, I received a note from your teacher today."

Son: "Honest, Pop? Give me a quarter and I won't breathe a word about it."

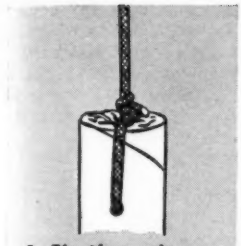
The following correction appeared in a small town paper:

"Our paper carried the notice last week that Mr. John Doe is a defective in the police force. This was a typographical error. Mr. Doe is really a detective in the police farce."

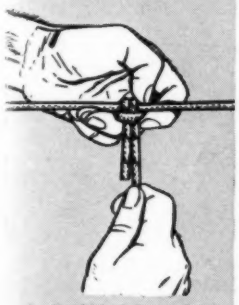
Neighbor: "Where's your brother, Freddie?"

Boy: "He's in the house playing a duet. I finished first."

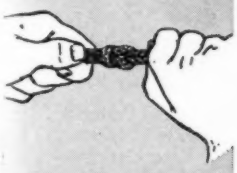
A young woman who has recently taken charge of a kindergarten entered a trolley car and as she took her seat, smiled pleasantly at a gentleman sitting opposite. He raised his hat, but it was evident that he did not know her. Realizing her error she said, in tones audible throughout the car, "Oh, please excuse me, I took you for the father of two of my children!" She left the car at the next stop.



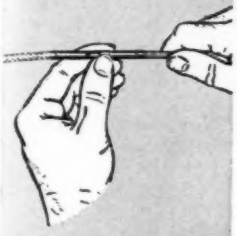
1. Tie through cartridge.



2. Half hitch branch to main line.



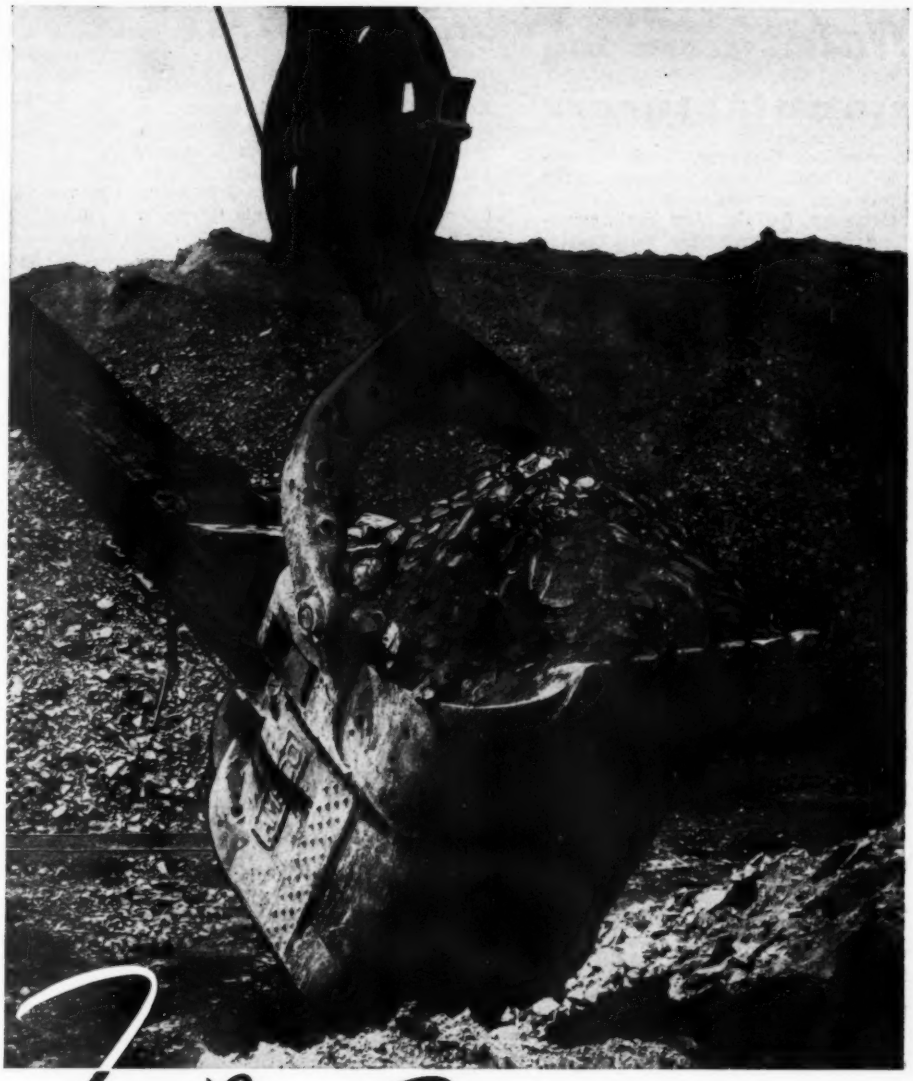
3. Connect main line lengths with square knot.



4. Fuse and cap on end of main line.

IMPORTANT

Branch lines should lead away from main lines at *right angles*. Avoid kinks and small loops.



for Better Fragmentation

It's cheaper to break up the stone in the original blast than it is to mud cap later on. Users of Primacord claim better fragmentation because: (1) Primacord, by acting as the detonating agent for each cartridge in the hole, gets more work out of the explosives. (2) While the detonating wave travels at a speed of nearly four miles per second, it is possible to plan the firing of successive holes and rows of holes to permit relief of burden. Send for the Primacord Book.

PRIMACORD BICKFORD
Detonating Fuse

PG-33

THE ENSIGN-BICKFORD COMPANY • SIMSBURY, CONN.

Makers of Cordeau-Bickford Detonating Fuse — and Safety Fuse since 1836

For your convenience in writing to The Ensign Bickford Co., you will find a card bound in this issue.

Notes from the manufacturers

Bucyrus-Erie Company, South Milwaukee, Wisconsin, recently appointed the following new distributors: Dow & Company, Buffalo, New York, covering northwestern New York state; Industrial Tractor & Equipment Company, Inc., Baton Rouge, Louisiana, has charge of the entire state except for the parishes around New Orleans and the Delta; and J. D. Adams Company, Billings, Montana, whose territory includes all of Montana east of the Rockies and eight counties in northern Wyoming. They will all handle ⅜-yard to 2½-yard shovels, draglines, clamshells and lifting cranes.

The Buda Company, Harvey, Illinois, announces the appointment of Dwight Richards as chief engineer, railroad division, in charge of the development of new products. Before joining the Buda Company, Mr. Richards was chief engineer of the English Company of Sullivan Machinery Company, in England, but due to the war he returned to America, in July of 1940. Since his graduation from Ohio State University he has served in an engineering capacity with several other firms, namely, Myers-Whaley Company, Insley Manufacturing Company, and Marion Steam Shovel Company.

The Union Wire Rope Corporation, Kansas City, Missouri, has opened a new Chicago office and warehouse in the One Hundred Eleven Building, 111 North Canal, Chicago, Illinois. They will be well equipped to serve their many friends in this territory.

The Buda Company, Harvey, Illinois, announces the opening of an office and display floor at 1469 Church Street, Washington, D. C. The office will be under the direction of Col. H. H. Frost, vice president. G. C. Humphreys is the manager of engineering and E. C. Asher is office manager.

Pioneer Engineering Works, Inc., Minneapolis, Minnesota, has made the following promotions: Carl R. Rolf who has been with the company since 1929 has been appointed assistant sales manager and Orval Ohnstad has been named district sales engineer covering the Dakotas, Minnesota, Wisconsin, Iowa, Nebraska, Kansas, and Missouri territories.

The Ransome Concrete Machinery Company, Dunellen, New Jersey, recently appointed Kern-Limmerick, Inc., 115 North Spring Street, Little Rock, Arkansas, as a new agent. They will handle the sale of a variety of Ransome equipment.

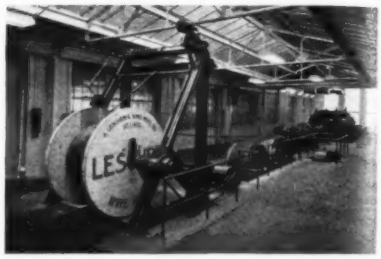
Chicago Pneumatic Tool Company, New York, has engaged the services of James P. Gillies to assist in general sales activities. Mr. Gillies is well known in the business world having been active in the industrial field for many years.

Chain Belt Company, Milwaukee, Wisconsin, announces the appointment of the Johnston Equipment Corporation, 1204-6-8 Fifth Street, Sioux City, Iowa, as its exclusive distributor of Rex construction equipment in the Sioux City area. Wagner M. Johnston, president, has been identified with the construction machinery industry for a number of years and has a background of experience which qualifies him well to serve construction equipment needs.

Patterson Equipment Company, 6275 Manchester Road, Cleveland, Ohio, distributors of contractors' machinery, and asphalt, sand and gravel equipment, recently moved their office to 605 Western Reserve Building, 1468 West 9th Street, Cleveland, Ohio.

R. G. LeTourneau, Inc., Peoria, Illinois, announces the purchase of the Avery Farm Machinery Company plant, located adjacent to the present LeTourneau factory in Peoria. The sale includes all of the buildings and equipment of the Avery Company with the exception of two buildings which were previously sold. The property has a frontage of 1300 feet and will add 282,000 square feet of floor space to the present LeTourneau plant.

A. Leschen & Sons Rope Company, St. Louis, Missouri, have installed a large new wire rope making machine —which they state is the last word in equipment of its kind. While this new wire rope "closer" is a giant in size,



more emphasis is placed on its ability to produce wire rope that will accurately meet definite and predetermined requirements, than on its actual capacity.

The George Haiss Mfg. Company, Inc., New York, New York, announces the appointment of new distributors for its products, as follows: Nixon-Hasselle Company, Carter at 13th Street, Chattanooga, Tennessee; Victor L. Phillips Company, 16th and Baltimore Streets, Kansas City, Missouri; and Drott Tractor Company, Inc., Milwaukee, Wisconsin.

Atlas Imperial Diesel Engine Company, Oakland, California, has elected G. N. Somerville vice-president. Mr. Somerville brings to his new position a seasoned background of experience, having progressed from the drawing board to chief engineer. In his long association with the Atlas Company he has held the positions of export manager, general sales manager, and has served on the company's board of directors.

The Ransome Concrete Machinery Company, Dunellen, New Jersey, has appointed The San Antonio Machine and Supply Company, San Antonio, Texas, to handle their complete line of contractors' equipment in certain sections of that State.

Union Wire Rope Corporation, 21st and Manchester, Kansas City, Missouri, has elevated Carl D. Schooley to the position of salesman covering the states of Minnesota, South Dakota, North Dakota, and Wisconsin. Prior to this advancement he worked as factory engineer in the Kansas City office.

It Spreads It Pulls-In

and that's not all—the Simplex Util-A-Tool cuts time and saves dollars on construction jobs by also clamping forms and parts for welding, bending "I"-beams and conduit, straightening bent structural members, binding loads and tensioning guy wires. Besides, it can be used as a regular 10-ton screw jack, as an emergency jack and is the most universal wheel puller yet devised.

Consists of 9 pieces of equipment in a handy metal carrying case. Costs less than $50.00 — frequently returns its cost on a single job. Ask your supply house for a demonstration.

Templeton, Kenly & Co.
Chicago
Better, Safer Construction Jacks Since 1899

Simplex Jacks
dependable and efficient
Lever Type for toe and cap lifting.
Hydraulic for easier cap lifting.
Screw Jacks for economy.

For your convenience in writing to Templeton, Kenly & Co., you will find a card bound in this issue.

POSITIONS WANTED

Positions wanted advertisements will be run under this heading for 5 cents per word, minimum charge $1.00. Advertisements for help wanted free of charge.

Address all box numbers c/o EXCAVATING ENGINEER . . . . . at South Milwaukee, Wisconsin

SUPT.-FOREMAN

With 20 years' experience of concrete work on all kinds of buildings, bridges, highway roads. Will go anywhere in United States. Best reference. Box 9165

EXPERIENCED OPERATOR

Excavator operator with fifteen years' experience on highway and sewer construction jobs desires steady work anywhere. Can do own repair work. References furnished. Age 32. Married. Now located in Missouri. Box 9159

BLAST HOLE DRILL OPERATOR

Blast hole drill operator, 10 years' experience on gas, diesel and electric, large and small machines. Can do own repair work. Middle age, single and willing to go anywhere in U. S. A. Excellent references. Box 9160

EXPERIENCED OPERATOR

Operator with 20 years' experience on steam, diesel and electric draglines and shovels. Prefers steady work in rock quarry, gravel pit or strip mine. Tools. Experienced on repairs. Married, sober, reliable. Best references. Box 9166

OPERATOR

Fully experienced shovel operator—electric, gas or steam power. Familiar with back hoe work. Can do erection and repairing. Will go anywhere. Box 9169

EXCAVATING EXECUTIVE

With 19 years' engineering and managerial experience covering road building, quarrying, dredging and general construction. Desires connection with active outfit that can make good use of a man with practical experience in handling men and machines. For full information write Box 9168

New trade literature

Title: **"New Techniques for Supervisors and Foremen"**

Subject: A thorough, yet interesting explanation of what we know about human behavior, how it is studied and measured, and the methods of applying the knowledge thus gained in all problems of managing, training, and stimulating workers. This is based on the approach successfully used by the author in many foremen's training groups.

Where to Get: McGraw-Hill Book Company, Inc., 330 West 42nd Street, New York, New York. Price, $2.50.

Title: **"Industrial Power Units and Motorized Valves"**

Subject: This catalog describes a line of motor power units and motorized valves designed to operate with Brown control instruments. Profusely illustrated, actual photographs are shown of electric control motors, slip stem globe type, rotary stem globe type, butterfly type, pilot operated, three-way and special valves. Dimension tables and schematic diagrams given an accurate idea of workmanship and operations.

Where to Get: The Brown Instrument Company, Wayne & Roberts Avenues, Philadelphia, Pennsylvania. Free upon request, ask for catalog No. 77-1.

Title: **"Pioneer 54-V Crushing and Screening Plant"**

Subject: Two section broadside dealing with the use of the 54-V for rock and gravel work with accompanying operation shots. Complete specifications also included covering the 54-V and 42-V plants.

Where to Get: Pioneer Engineering Works, Inc., Minneapolis, Minnesota. Free upon request, ask for form No. 534.

Title: **"The First 25"**

Subject: In a recent search into the history of the earliest-built "Caterpillar" diesel tractors, the company found that of the first 25 manufactured, 24 are still operating, either as tractors or power units. The case records of these early machines make up an interesting, fact-giving booklet. Photographs of these installations accompany each story.

Where to Get: Caterpillar Tractor Company, Peoria, Illinois. Free upon request, ask for form 6539.

Title: **"Sauerman Slackline Cableway Excavators"**

Subject: Operating principles are explained and the field usefulness is defined. Following, are specifications and descriptions of the important mechanical details. The various applications of the equipment then are illustrated by means of photographs of typical installations.

Where to Get: Sauerman Brothers, Inc., 474 South Clinton Street, Chicago, Illinois. Free upon request, ask for section C, catalog 19.

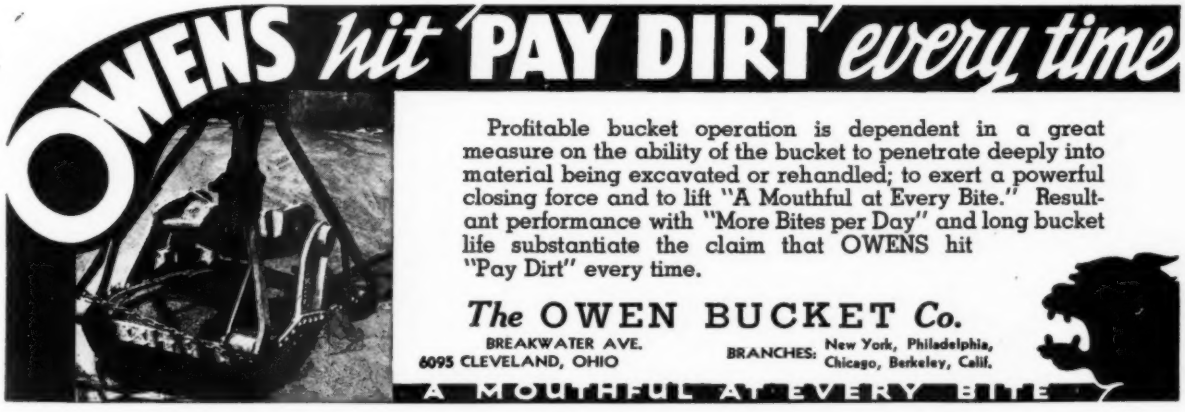
Title: **"Hydraulic Bullgraders and Bulldozers"**

Subject: Highlighted with a variety of sixty photographs, this new 24-page bulletin contains drawings and diagrams accompanied by an easily understandable explanation of the construction details and design features of these new 'graders and 'dozers. Also included are complete specifications for attachment to three International TracTracTor models, TD-6, TD-9 and TD-18.

Where to Get: Bucyrus-Erie Company, South Milwaukee, Wisconsin. Free upon request, ask for bulletin No. BGD-6.

Title: **"Pressure Oil Filter"**

Subject: Comprises 28 pages, with numerous illustrations not only of this product and its operation, but every conceivable application. How any liquid that contains foreign solids, as small as .0001", that will not destroy the filtering medium or its parts, can


OWENS hit PAY DIRT every time
Profitable bucket operation is dependent in a great measure on the ability of the bucket to penetrate deeply into material being excavated or rehandled; to exert a powerful closing force and to lift "A Mouthful at Every Bite." Resultant performance with "More Bites per Day" and long bucket life substantiate the claim that OWENS hit "Pay Dirt" every time.
The OWEN BUCKET Co.
BREAKWATER AVE.
6095 CLEVELAND, OHIO
BRANCHES: New York, Philadelphia, Chicago, Berkeley, Calif.
A MOUTHFUL AT EVERY BITE

For your convenience in writing to The Owen Bucket Co., you will find a card bound in this issue.

be successfully handled is also dealt with.

Where to Get: Wm. W. Nugent & Company, Inc., 410-412 North Hermitage Avenue, Chicago, Illinois. Free upon request, ask for bulletin No. 7A.

Title: "LaPlant-Choate Equipment"

Subject: A description of each product manufactured by this company. Sections are devoted to land clearing, earth moving, and snow removal equipment. Each product is illustrated and a short description of its uses included.

Where to Get: LaPlant-Choate Manufacturing Company, Inc., Cedar Rapids, Iowa. Free upon request, ask for form No. A-110-636.

Title: "Thor Air Tools"

Subject: Descriptive analysis of the complete line of mining and contractors air-powered tools with specifications and a graphic depiction of applications and uses for all the various products. Illustrated in two colors, the new catalog also gives detailed information on accessories and equipment for use with the tools and points out important construction features.

Where to Get: Independent Pneumatic Tool Company, 600 West Jackson Blvd., Chicago, Illinois. Free upon request, ask for catalog No. 42.

Title: "The Greatest Mixers Rex Has Ever Built"

Subject: The complete line of Rex concrete mixers from the 3½-S up to and including the 14-S are described and illustrated together with complete information on their individual features. Accessories are also shown. One of the interesting features of the catalog is the "tab" indexing which sectionalizes the book by machines and features. In the rear of the book are very complete specifications on each machine in the line.

Where to Get: Chain Belt Company, Milwaukee, Wisconsin. Free upon request, ask for bulletin No. 380.

Title: "Get What You Want in a 'Dozer"

Subject: The use of angledozers and bulldozers from clearing to final finishing is graphically illustrated in this 8-page folder. The universal applications of 'dozers on all forms of earthmoving, construction, pioneering and handling has made this tractor tool indispensable. Job methods used by well-known contractors throughout the country are illustrated and described. Design and features of the 'dozer are shown on two full pages.

Where to Get: R. G. LeTourneau, Inc., Peoria, Illinois. Free upon request, ask for folder A-18.

BARGAINS IN USED EQUIPMENT

FOR SALE, RENTALS, BUSINESS OPPORTUNITIES, TRADES, ETC.

To the reader wishing to advertise used equipment in the "For Sale" Section: All advertising in this section is payable in advance. Enclose your check or money order with copy. Rate: 60c per line. Minimum charge $2.40. No discounts; no commissions. If no change in copy is desired, three continuous insertions are offered for the price of two. Read these instructions carefully. Each line contains 41 characters (34 characters if all capital letters are used). Count spaces and punctuation as one character each. Allow 10 characters for box number, if blind advertisement is desired. Count your own copy to save delay. Holding up your advertisement one month to secure approval of revised copy or an additional remittance may cost you real money in a lost sale. Be sure to enclose the correct amount of money with your order. Closing date—15th of preceding month. Example: January issue closes December 15th.

To the reader wishing to answer "For Sale" Section advertisements appearing on these pages: Be sure to address your inquiry to the advertiser by using the correct box number. Mail your letter in care of Excavating Engineer, South Milwaukee, Wisconsin. Write each advertiser a separate letter. Do not write us for name and address of advertiser. This information will not be given out. We have no information about the equipment advertised other than that shown in the advertisements themselves.

SMALL SHOVELS, CRANES AND DRAGLINES

Up to 2½ Cubic Yards

P&H MODEL 206—¾-yd. shovel. Operating condition. Waukesha engine. Located Chicago area. Box 2760

OSGOOD "CONQUEROR" Gas Combination 40' boom dragline and clamshell. Operating condition. LeRoi engine. Located Missouri. Box 2742

MARION MODEL 331 Diesel Dragline. 45' boom. 1 yd. YAUN Basket type drag bucket. Kohler light plant. Has only worked two years. A-1 condition. Located Louisiana. Box 2745

BUCYRUS-ERIE GA-2 High Lift 1 yd. Shovel. Waukesha WS engine. Single Shaft Cats. Operating condition. Located eastern Pennsylvania. Box 2776

LINK-BELT MODEL K-48 Gas Shovel. 1¾-yd. Esco dipper. Good operating condition. Located Montana. Box 2618

BUCYRUS-ERIE GA-2 Gas-Air high lift shovel. 24' boom. 18'4" dipper handle. 1¼ yd. dipper. Waukesha 6¼"x8" 4-cylinder engine. Electric starter. Quantity spare parts included. Excellent condition. Located Eastern Pennsylvania. Box 2774

BUCYRUS-ERIE 10-B Gas Dragline and ½-yard drag bucket. High altitude engine. Excellent condition. Less than one year old. Located Montana. Box 2764

NORTHWEST MODEL 105 gasoline caterpillar mounted Shovel. Re-built with late design cats and boom. Good operating condition. Located Washington. Box 2762

P&H 206. ¾-yd. dragline or clamshell. Waukesha engine. 40 or 50 ft. boom. Also 10-ton Holt caterpillar tractor. Both in good shape. Box 2758

P&H MODEL 206-C. Gasoline. 43'-0" Boom. Dragline and Clamshell, including ¾-yard Clamshell Bucket. Good operating condition. Located Oregon. Box 2763

BUCYRUS-ERIE 10-B Gas Shovel-Twin Rope Crowd. Buda engine. Excellent condition. Located Georgia. Box 2735

KEYSTONE MODEL 4 — Gasoline dragshovel. Operating condition. Located western Pennsylvania. Box 2773

MARION Model 381 Shovel. Waukesha-Hesselman 6-cylinder 7"x7" engine, 182 H.P. at 1000 R.P.M. 25'6" boom—17'6" dipper handle—2¼-yard dipper. Substantially field reconditioned Located Chicago. Box 2725

If You Do Not Find What You Want Listed — Write Us

EXCAVATING engineer

South Milwaukee, Wis.

ONE BUCYRUS-ERIE 43-B diesel powered shovel. In first class operating condition in every way. Located Texas. Box 2754

LIMA MODEL 801 Waukesha-Hesselman 70' boom dragline including 2½ yard AX drag bucket. Engine just factory rebuilt with guarantee. First class mechanical and operating condition. Located Illinois. Box 2746

BUCYRUS-ERIE MODEL 1030. Gasoline. Clamshell. 50 ft. Boom. ¾-yard Owen Digging Bucket. Also Dragshovel equipment. Good operating condition. Working every day. Located Detroit. Box 2768

LORAIN MODEL 60 1 yd. Gas Shovel. Waukesha engine. Machine generally overhauled few months past. Operating condition. Located Minnesota. Box 2743

BUCYRUS-ERIE GA-2 Gas-Air 65' boom Clamshell. Waukesha engine. A-1 condition. Located Illinois. Box 2744

BUCYRUS-ERIE GA-2 Gas-Air 1 yd. Shovel. Very good operating condition. Located North Carolina. Box 2708

BUCYRUS-ERIE 55-B Diesel Dragline. 75'-0" Boom. Oversize Cats. Atlas engine. Now operating Kansas. Box 2766

LIMA 1001 Electric Dragline. 60' boom. 2½ yard Heavy Duty Esco drag bucket. 1000' power cable. Motor 200 HP Slip ring type 3 phase 60 cycle 440 volt. Excellent condition. Located California. Box 2747

BUCYRUS-ERIE 50-B Electric Shovel. 30' boom, 17' dipper handle, 2-cu. yd. dipper. 3 motor suitable for power supply 3 phase 25 cycle 440 volt. Excellent condition. Located Southern Wisconsin. Box 2750

KOEHRING MODEL 401 Combination Shovel, dragline and clamshell. Located Missouri. Box 2741

BUCYRUS-ERIE 20-B ¾ yard 2 motor electric shovel. Suitable for power supply of 3 phase 60 cycle 440 volt. Now operating. Located Tennessee. Box 2738

AMERICAN MODEL G.S. 1-yard Gas Clamshell. 50 ft. Boom. Waukesha Engine. Good condition and appearance. Located Detroit. Box 2770

BUCYRUS-ERIE 52-B Diesel Dragline. 75'-0" Boom. Oversize Cat Mounting. Atlas Engine. Now operating in Nebraska. Box 2765

Dragline-Crane For Rent

READY TO WORK. K44 Link-Belt crawler dragline-crane. 55' boom, 1¾-yd. drag bucket. Crane capacity 25 tons at 12'. Light Plant. Located Iowa. Box 2756

BUCYRUS-ERIE 10-B Gas Dragline and Crane—28' boom, ⅜ yd. AX drag bucket. Three ton hook block. Independent boom hoist. Buda engine. Used only six months. Reasonable price. Located Kansas. Box 2737